

CURRICULUM VITAE

PERSONAL INFORMATION

Name Thomas D. Schmittgen, Ph.D.

Business Address
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Department of Pharmaceutics
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EDUCATION

<u>Institution</u>	<u>Degree</u>	<u>Year</u>	<u>Field</u>
College of Pharmacy Ohio State University Columbus, Ohio	B.S.	1985	Pharmacy
College of Pharmacy Ohio State University Columbus, Ohio	Ph.D.	1992	Pharmaceutics (Dr. J. L-S. Au)
School of Medicine University of Southern California Los Angeles, California	Postdoctoral	1992-95	Biochemistry & Molecular Biology (Dr. P. V. Danenberg)

RESEARCH and PROFESSIONAL EXPERIENCE

- 2018-date Interim Director, Center for Pharmacometrics and Systems Pharmacology, University of Florida College of Pharmacy.
- 2018-date Department Chair, University of Florida College of Pharmacy, Department of Pharmaceutics, Gainesville, Florida.
- 2015-date Professor, University of Florida College of Pharmacy, Department of Pharmaceutics, Gainesville, Florida.
- 2013-2015 Professor, Ohio State University College of Pharmacy, Division of Pharmaceutics & Pharmaceutical Chemistry, Columbus, Ohio.
- 2010-2015 Chair, Division of Pharmaceutics & Pharmaceutical Chemistry, Ohio State University College of Pharmacy, Columbus, Ohio.
- 2004-2015 Full Member, Comprehensive Cancer Center, Ohio State University, Columbus, Ohio.
- 2003-2015 Faculty appointment in the program for Molecular, Cellular and Developmental Biology, Ohio State University, Columbus, Ohio.
- 2002-2013 Associate Professor, Ohio State University College of Pharmacy, Division of Pharmaceutics & Pharmaceutical Chemistry, Columbus, Ohio.
- 2001-2002 Associate Professor, Washington State University College of Pharmacy, Department of Pharmaceutical Sciences, Pullman, Washington, tenured 2001.
- 1995-2001 Assistant Professor, Washington State University College of Pharmacy, Department of Pharmaceutical Sciences, Pullman, Washington.
- 1992-1995 Postdoctoral Fellow, University of Southern California School of Medicine, Department of Biochemistry & Molecular Biology, Los Angeles, California,
- 1987-1992 Graduate Student, Ohio State University College of Pharmacy, Department of Pharmaceutics and Pharmaceutical Chemistry, Columbus, Ohio.
- 1985-1987 Formulation Scientist, Eurand America, Inc., (Division of A.H. Robbins), Vandalia, Ohio.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Association for Cancer Research
American Association of Pharmaceutical Scientists

American Association for the Advancement of Science
 International Society of Extracellular Vesicles
 American Association of Colleges of Pharmacy
 American Society for Clinical Pharmacology and Therapeutics

HONORS AND AWARDS

V. Ravi Chandran Professor of Pharmaceutical Sciences, 2018-date.
 Distinguished alumni award, Ohio State University, College of Pharmacy, 2018.
 Best basic science paper, University of Florida, College of Pharmacy, 2017.
 Fellow, American Association of Pharmaceutical Scientists.
 Co-author of the 21st most cited scientific paper of all time (as reported in Nature, Oct. 2014).
 Inventor of the year, TechColumbus Innovation Awards, 2011.
 Individual National Research Service Award, National Institutes of Health, 1993-1995.
 Berlex Fellow, 1990-91.

EDITORIAL AND REVIEWER SERVICE:

NIH Proposal Reviews

<u>Meeting date, Role</u>	<u>Study Section</u>	<u>Committee Panel Name</u>
2017 Ad hoc member	EBIT ZCA1 PCRB-G	Enabling Bioanalytical and Imaging Technologies
2016 Ad hoc member	(C1) ZCA1 TCRB-U	Special Emphasis Panel, NCI, Cancer Diagnosis
2015 Ad hoc member	(C1)	Special Emphasis Panel, NCI, Cell-free Nucleic Acid Based Assays
2013 Ad hoc member	ZCA1 GGG-R (51) ZCA1 SRLB -	Special Emphasis Panel, NCI, Extracellular RNA Biomarkers
2012 Ad hoc member	Q(O1) ZCA1 SRLB -	Innovative Molecular Analysis Technologies (IMAT) for Cancer, NCI
2010 Ad hoc member	Q(M2)	Innovative Technologies Development, NCI
2010 Ad hoc member	ZRG1 IMST-J (15) ZCA1 SRLB -	Small Business: Genes, Genomes, and Genetics, NCI
2009 Ad hoc member	R(O1) ZCA1 SRRB -	Innovative Technologies Development for Cancer Research, NCI
2008 Ad hoc member	Y(M1) ZCA1 SRLB -	Cancer Prevention Research Small Grant Program, NCI
2008 Ad hoc member	Q(M1) ZCA1 SRRB-C	Innovative Molecular Analysis Technologies (IMAT)for Cancer, NCI
2007 Ad hoc member	(M1) ZRG1 MONC-U	Innovative Technologies for Molecular Analysis of Cancer, NCI
2006 Ad hoc member	(O1)	Molecular Oncogenesis, NCI
2005 Ad hoc member	ZRG1 BST-F (91)	Assays and Methods Development, NCI
2004 Ad hoc member	ZRG1 BST-F (02)	Assays and Methods Development, NCI
2001 Ad hoc member	ZRG1 SSS-1 (10)	Special Emphasis Panel, NCI

Member of Editorial Board

Cancers

Frontiers Genetics

*Journal of Nucleic Acid Investigation
Methods*

*American Journal of Cancer Research
Noncoding RNA*

Guest Editor: "Real-Time Quantitative PCR" for *Methods: A Companion to Methods in Enzymology* 25 (4), 2001.

Guest Editor: "microRNA Part B" for *Methods: A Companion to Methods in Enzymology*. 44 (1), 2008.

Manuscript reviewer

Analytical Biochemistry

Clinical Chemistry

Biotechniques

International Journal of Cancer

Nucleic Acids Research

Molecular Cancer Therapeutics

Gut

Mammalian Genome

RNA

PLOSOne

Oncotarget

Cell Death Disease

Stem Cell Trans Med

Hepatology

Blood

BMC Genomics

BMC Molecular Biology

Genomics

British Journal of Cancer

Cancer Research

Laboratory Investigation

Molecular Cancer

Lancet

Proceedings of the Natl. Acad. Sciences (USA)

Gastroenterology

Nanomedicine

J Extracell Vesicles

Tissue Engineering

Nature Communications

Cell Cycle

RESEARCH SUPPORT

Current Support (direct costs listed)

Title: Targeted delivery of microRNA-loaded microvesicle for cancer therapy (Schmittgen, Phelps, mPI).

Agency: NIH 3UH2TR000914

Amount: \$2,164,898

Dates: 7/13 to 7/18 (no cost extension through 7/19)

Role: Schmittgen, T.D. (corresponding PI)

Title: Florida-California Cancer Research, Education and Engagement (CaRE2) Health Equity Center (Odedina, Wilke mPIs)

Agency: NCI U54CA233441

Amount: \$200,000 (Pilot project only)

Dates: 9/01/18 to 8/31/21

Role: Schmittgen, T.D. (PI of R21 Pilot Project, 1.5 calendar months)

Title: Novel Targeted Anticancer Agents from Marine Cyanobacteria (Luesch)

Agency: NIH 2R01CA172310-06

Amount: \$2,246,836

Dates: 9/1/2018 – 8/31/2023

Principal Investigator: Schmittgen, co-I (0.6 Calendar months)
Pending Support (direct costs listed)

1R61DA048486-01A1 Schmittgen (contact PI, 1.2 calendar months), McMahon (mPI)
NIH 4/1/20 to 3/31/25
Extracellular RNA as biomarker and mediator of pain
\$1,500,000
Impact score: 30 (not percentiled)

1R21CA225564-01A1 Schmittgen (PI, 0.5 calendar months).
NIH 4/1/20 to 3/31/23
Drug screens targeting the plasticity of pancreatic cells
Evaluate a novel drug screening platform to discover treatments for pancreatic cancer.
\$400,000

Past Support (direct costs listed)

University of Florida, College of Pharmacy, Intramural grant (PROSPER) program. Therapeutic exosome production, scale up and purification for preclinical studies. \$40,000, T.D. Schmittgen (PI), 7/18 to 12/18.

University of Florida, College of Pharmacy, Intramural grant (PROSPER) program. A medium throughput screen to discover compounds that interfere with the early events in the development of pancreatic cancer. \$37,000

Administrative supplement to parent award: Targeted delivery of microRNA-loaded microvesicle for cancer therapy, NIH 3UH2TR000914-03S1, \$50,000, 08/16-07/17
Schmittgen, T.D. (mPI), Phelps, M.A. (mPI)

Administrative supplement to parent award: Targeted delivery of microRNA-loaded microvesicle for cancer therapy, NIH 3UH2TR000914-03S1, \$50,000, 08/15-07/16
Schmittgen, T.D. (mPI), Phelps, M.A. (mPI)

Administrative supplement to parent award: Targeted delivery of microRNA-loaded microvesicle for cancer therapy, NIH 3UH2TR000914-03S1, \$50,000, 08/14-07/15.
Schmittgen, T.D. (mPI), Phelps, M.A. (mPI)

miRNA Biomarkers for Hepatocellular Carcinoma Associated with Viral Hepatitis, NCI, 1R21CA170096, 07/12-6/14, Principal Investigator: T.D. Schmittgen.

Administrative supplement to parent award: miRNA Biomarkers for Hepatocellular Carcinoma Associated with Viral Hepatitis, NIH/NCI, 1R21CA170096, \$25,128, 07/13-06/14, Principal Investigator: T.D. Schmittgen.

Administrative supplement to parent award: Targeted delivery of microRNA-loaded microvesicle for cancer therapy, NIH, \$50,000, 08/14-07/15, T.D. Schmittgen, M.A. Phelps mPI.

Early Diagnosis of Pancreatic Cancer, NCI, UO1 2U01CA111294-06, \$300,000, 07/10-06/15, Principal Investigator: M.A. Hollingsworth, PI of subcontract: T.D. Schmittgen.

Administrative supplement to parent award: Early Diagnosis of Pancreatic Cancer, NIH, UO1 2U01CA111294-06, \$50,000, 08/14-07/15, Principal Investigator: T.D. Schmittgen.

Pancreas Specific microRNA Knockout for Tumorigenesis Study, OSUCCC Intramural funding, \$100,000, 09/12-10/14, Principal Investigator: T.D. Schmittgen.

Real-time PCR expression profiling of microRNA, NIH, R21/R33 CA114304, \$840,732 (total costs), 08/06-05/11, Principal Investigator: T.D. Schmittgen.

Roles of microRNAs and ultraconserved genes in pancreatic cancers, Pancreatic Cancer Action Network-AACR Pilot Grant, \$200,000, 07/09-06/11, Principal Investigator: G.A. Calin, Co- Investigator: T.D. Schmittgen.

microRNA profiling in cystic fluid of intraductal papillary mucinous neoplasms, NIH, U01 CA084986, \$100,000 (direct costs), 02/09-01/11, Principal Investigator: T.D. Schmittgen.

microRNA profiling in microdissected pancreatic precursor lesions, OSU Center for Clinical & Translational Sciences, \$5,000, 05/10-04/11, Principal Investigator: T.D. Schmittgen.

microRNA profiling in serum of pancreatic adenocarcinoma patients, Lustgarten Foundation for Pancreatic Cancer Research, \$ 90,000, 03/09-02/10, Principal Investigator: T.D. Schmittgen.

Past Support, cont'd (direct costs listed)

Human angiotensin II receptor gene regulation, NIH, 5R01 HL048848, \$872,083, 07/06-06/11, Principal Investigator, T.S. Elton; Collaborative Investigator: T.D. Schmittgen (5% Effort).

Pharmacology of Nonsteroidal Androgen Receptor Ligands, NIH, 1 R01 DK59800-05, \$1,452,176, 9/04-8/08, J.T. Dalton, Principal Investigator, T.D. Schmittgen (co-investigator).
Antisense knockdown of microRNA for pancreatic cancer therapy, National Pancreas Foundation, \$25,000, 06/06-05/07, T.D. Schmittgen, Principal Investigator.

Aptamer-drug conjugates for prostate cancer therapy, U.S. Army, Department of Defense, DAMD17-02-1-0156, \$225,000, 8/03-9/06. T.D. Schmittgen, Principal Investigator.

Improved bioanalytical methods for oligonucleotide drugs, Ohio State University Comprehensive Cancer Center, Experimental Therapeutics seed grant, \$10,000, 06/06 to 12/06. T.D. Schmittgen, Principal Investigator.

Micro RNA expression and Cancer, NIH, 1 R21 CA107435, \$180,000, 5/04-4/06. T.D. Schmittgen, Principal Investigator.

Aptamers targeting HER2 positive breast cancers, Oklahoma Health Research Program, \$135,000, 9/02-8/05, E.R. Jupe Principal Investigator, T.D. Schmittgen, Co-investigator

Aptamers as cellular targeting agents, NIH, 1R21 CA81396-01, \$200,000, 4/99-3/01. T.D. Schmittgen, Principal Investigator.

Effects of 5-fluorouracil on uracil-rich mRNA stability, NIH, 1R15 CA74375, \$75,000, 6/97-5/00 T.D. Schmittgen, Principal Investigator.

Effects of 5-fluorouracil incorporation into the uracil-rich destabilizing sequences of mRNAs involved in growth regulation. American Cancer Society, IRG-119Q, \$15,000, 8/95-6/96. T.D. Schmittgen, Principal Investigator.

INVITED LECTURES AND SEMINARS

1. Pharmacodynamics of mitomycin C in cultured human bladder tumors. Norris Comprehensive Cancer Center, University of Southern California, Los Angeles, California, September, 1991.
2. Inhibition of RNA splicing by anticancer drugs. College of Pharmacy, University of Illinois at Chicago, Chicago, Illinois, March, 1994.
3. Inhibition of RNA splicing by anticancer drugs. Department of Pharmacology, Stanford University, Palo Alto, California, December, 1994.
4. Molecular determinants of the pharmacodynamic response to cancer chemotherapy. Washington State University, Department of Pharmaceutical Sciences, Pullman, Washington, March, 1995.
5. Effects of the anticancer drug 5-fluorouracil on mRNA stability: A quantitative RT-PCR analysis. Epoch Pharmaceuticals, Redmond, Washington, October, 1998.
6. Pharmacological studies with RNA. College of Pharmacy, University of Tennessee, Department of Pharmaceutical Sciences, Memphis, Tennessee, March, 1999.

7. Pharmacological studies with RNA. College of Pharmacy, University of Texas, Department of Pharmaceutics, Austin, Texas, September, 1999.
8. RNA-directed activity of fluoropyrimidines. College of Pharmacy, Ohio State University, Department of Pharmaceutics, Columbus, Ohio, December, 2000.
9. Molecular Approaches for the Detection of Prostate Cancer. College of Pharmacy, University of Minnesota, Department of Experimental and Clinical Pharmacology, Minneapolis, Minnesota, June, 2001.
10. Molecular Approaches for the Detection of Prostate Cancer. College of Pharmacy, University of Minnesota, Department of Pharmaceutics, Minneapolis, Minnesota, August, 2001.
11. Aptamer-based drug delivery strategies. College of Pharmacy, Ohio State University, Division of Pharmaceutics, Columbus, Ohio, November, 2001.
12. Aptamer-based drug targeting strategies. College of Pharmacy, Medical University of South Carolina, Department of Pharmaceutical Sciences, Charleston, South Carolina, December, 2001.
13. Real-time expression profiling of microRNAs in cancer, Oklahoma University, Division of Surgery, Oklahoma City, Oklahoma, April, 2005.
14. Real-time expression profiling of microRNAs in cancer, Discovery Science and Biotechnology Conference, Melbourne, Australia, May, 2005.
15. Real-time PCR analysis of precursor and mature microRNAs in pancreatic adenocarcinoma, Cambridge Healthtech Institute conference on nucleic acid-based technologies, Arlington Virginia, June, 2006.
16. microRNA as a potential therapeutic target for pancreatic cancer. Ninth international conference on drug and gene-based therapeutics. Crete, Greece, September, 2006.
17. PCR based microRNA expression profile reveals unique signature in pancreatic cancer. NCI sponsored workshop, Micro RNA: Potential for Cancer Detection, Diagnosis and Prognosis, Rockville, Maryland, November, 2006.
18. Expression profiling of miRNA in human cancer. 14th EDRN steering committee meeting. Denver, Colorado, March, 2007.
19. Expression profiling of miRNA in human cancer. MBI workshop on microRNA in Development and Cancer. Columbus, Ohio, April, 2007.

20. Real-time PCR expression profiling of microRNA. Solid tumor retreat, Ohio State University Comprehensive Cancer Center, Columbus, Ohio, June, 2007.
21. Real-time PCR quantification of precursor and mature microRNA. Applied Biosystems, Foster City, California. August, 2007.
22. microRNA-directed therapy for pancreatic cancer. Isis Pharmaceuticals, Carlsbad, California, August, 2007.
23. Aberrant microRNA expression in pancreatic cancer: Diagnostic and therapeutic implications. Wright State University, Department of Biochemistry and Molecular Biology, Dayton, Ohio, October, 2007.
24. microRNA-directed therapy for pancreatic cancer. Annual meeting of the Korean Society of Pharmaceutical Science and Technology. Seoul, Korea, November, 2007.
25. microRNA-directed therapy for pancreatic cancer. microRNA in human disease and development. Cambridge Healthtech Institute. Cambridge, Massachusetts, March, 2008.
26. microRNA-directed therapy for pancreatic cancer. GTx Inc., Memphis, Tennessee, July, 2008.
27. Real-time PCR quantification of precursor and mature microRNAs as a means to study post transcriptional regulation of microRNA. Ninth principal investigators meeting for the innovative molecular analysis technologies (IMAT) program. Cambridge, Massachusetts, October, 2008.
28. Real-time PCR expression profiling of microRNA. qPCR Symposium USA. San Francisco, California, November, 2008.
29. Real-time PCR expression profiling of microRNA. Applied Biosystems Reception at the 58th Annual Meeting of the American Society of Human Genetics. Philadelphia, Pennsylvania, November, 2008.
30. Role of microRNAs in pancreatic adenocarcinoma. 4th Annual M. D. Anderson/Baylor College of Medicine Symposium: Development of Non-Coding RNAs for Cancer Therapy. Houston, Texas, January, 2009.
31. Real-time PCR expression profiling of microRNA. The Association of Biomolecular Research Facilities (ABRF) Annual Meeting. Memphis, Tennessee, February, 2009.
32. Role of microRNAs in pancreatic cancer. RNAi World Congress. Boston, Massachusetts, May, 2009.

33. Update on microRNA-based biomarkers for pancreatic adenocarcinoma. Presentation to the Board of Directors, Michael Rolfe Pancreatic Cancer Foundation, Chicago, Illinois, June, 2009.
34. Post transcriptional regulation of microRNA processing in human tumors and cancer cell lines. 10th International Conference on Environmental Mutagens (ICEM). Firenze, Italy. August, 2009.
35. The potential for microRNA-based biomarkers in pancreatic adenocarcinoma. EDRN Scientific Workshop. Bethesda, Maryland, September, 2009.
36. Methods for qPCR of miRNA and other ncRNA. The Association of Biomolecular Research Facilities (ABRF) Annual Meeting. Sacramento, California, March, 2010.
37. qPCR profiling of precursor and mature microRNA. Workshop on genomics and microRNA. 101st Annual Meeting of the American Association for Cancer Research, Washington D.C., April, 2010.
38. qPCR detection of microRNAs as diagnostic agents for pancreatic cancer. microRNA in Human Disease & Development, Cambridge Healthtech Institute, Cambridge, Massachusetts, March, 2010.
39. Antisense therapy against miR-221 in hepatocellular carcinoma. College of Pharmacy Research Day, Ohio State University, Columbus, Ohio, May, 2010.
40. Role of microRNA in pancreatic adenocarcinoma. Department of Surgery, University of Michigan, Ann Arbor, Michigan, May, 2010.
41. Laser capture microdissection and microRNA profiling. Center for clinical and translational sciences. Ohio State University, Columbus, Ohio, June, 2010.
42. MicroRNA silencing with antagomiR oligonucleotides: miR-221 as a therapeutic target for hepatocellular carcinoma. Pharmaceutics Graduate Student Research Meeting (PGSRM), Columbus, Ohio, June, 2010.
43. microRNAs as diagnostic agents and therapeutic targets for cancer. Division of Pharmaceutical Sciences, Washington State University, Pullman, Washington, July, 2010.
44. microRNA as a therapeutic target for hepatocellular carcinoma. Cancer and Cell Biology Seminar Series, University of Cincinnati, Cincinnati, Ohio, January 2011.
45. qPCR applications of microRNA and other noncoding RNAs. Advances in qPCR Conference, Boston, Massachusetts, April, 2011.

46. Therapeutic microRNA mimetic and antisense oligonucleotides. Lombardi Cancer Center, Georgetown University, November, 2011.
47. Therapeutic microRNA mimetic and antisense oligonucleotides. microRNA in Human Disease & Development, Cambridge Healthtech Institute, Cambridge, Massachusetts, March, 2012.
48. Role of microRNA in pancreatic and liver cancers. microRNA 2012 International Symposium, São Paulo, Brazil, March, 2012.
49. Therapeutic microRNA mimetic and antisense oligonucleotides. Ohio State University Department of Veterinary Medicine, September, 2012.
50. Therapeutic microRNA mimetic and antisense oligonucleotides. University of Oslo, Oslo, Norway, December, 2012.
51. Therapeutic microRNA mimetic and antisense oligonucleotides. Ohio State University College of Pharmacy, Division of Pharmacology, January, 2013
52. Therapeutic microRNA mimetic and antisense oligonucleotides. University of Iowa, College of Pharmacy, Division of Medicinal Chemistry, April, 2013.
53. Engineered microvesicles as targeted delivery agents for cancer. John Carroll University, Department of Chemistry, Cleveland, Ohio, October, 2013.
54. Navigating your way through the patent process in academia. University of Texas Southwestern Medical Center, Dallas, Texas, March 2014.
55. Engineered microvesicles as targeted delivery agents for cancer. 2014 World Forum on Biology. Savannah, Georgia, June, 2014.
56. Engineered microvesicles as targeted delivery agents for therapeutic microRNAs. "Illuminating Genomic Dark Matter" symposium. University of Texas M.D. Anderson Cancer Center, Houston, Texas, October, 2014.
57. microRNA for cancer therapy: Targets, mechanism and delivery. University of Florida Cancer Center, Gainesville, Florida, October, 2014.
58. Microvesicle Engineering for Targeted Delivery of microRNA. The Ohio State University Comprehensive Cancer Center, Translational Therapeutics Retreat, October, 2014.
59. Microvesicle Engineering for Targeted Delivery of microRNA. University of British Columbia Faculty of Pharmaceutical Sciences, Vancouver, BC, November, 2014.

60. The mTOR pathway as a novel therapeutic target for hepatocellular carcinoma. The Ohio State University Gastrointestinal Oncology section, January, 2015.
61. Biological relevance of miRNAs and other non-coding RNAs as diagnostics. National Cancer Institute think tank on establishing best practices in non-coding application in cancer detection, diagnosis and prognosis. Bethesda, Maryland, January, 2015.
62. Engineered microvesicles as targeted delivery agents for therapeutic microRNAs. Gordon Research Conference on RNA Nanotechnology, Ventura, California, February, 2015.
63. Gene knockouts reveal important roles for microRNA during the early development of pancreatic adenocarcinoma. 2nd International Symposium on Frontiers in Molecular Science Non-Coding RNAs and Epigenetics in Cancer. Basel, Switzerland, June 2017.
64. Exosomes, new kid on the block for drug delivery. University of Florida Global Gator Meeting, Dusseldorf, Germany, 2017.
65. Endogenous loading of microRNA into therapeutic extracellular vesicles. First Conference on Biomotors, Virus Assembly, and Nanobiotechnology Applications. Columbus, Ohio, August 18, 2017.
66. Drug screens targeting the early events in the development of pancreas cancer. University of Florida Drug Discovery Symposia, Gainesville, Florida, September, 2017.
67. A microRNA and pancreatic cancer link: Implications for therapy and early detection. School of Medicine, North Dakota State University, Fargo, North Dakota, April, 2018.
68. Extracellular vesicle production and characterization. Regenerative Medicine Symposium, University of Florida School of Medicine, June, 2018.
69. Achieving the Promise of Therapeutic Exosomes: The Devil is in the Details of Therapeutic Loading and Manufacturing. Michigan State University, Institute for Quantitative Health Science & Engineering and Biomedical Engineering. Lansing, Michigan, January 2019.

PEER-REVIEWED RESEARCH ARTICLES

1. Wallace, R.A., Boldry, R., Schmittgen, T., Uretsky, N., and Miller, D. Effect of 1-methyl-4-phenyl-1,2,5,6 tetrahydro-pyridine (MPTP) on monoamine neurotransmitters in mouse heart and brain. **Life Sciences**, 35:285-291, 1984.
2. Schmittgen, T.D., Au, J. L-S., Wientjes, M.G., Badalament, R.A., and Drago, J.R. Cultured human bladder tumors for pharmacodynamic studies. **J. Urol.**, 145:203-207, 1991.

3. Schmittgen, T.D., Wientjes, M.G., Badalament, R.A., and Au, J. L-S. Pharmacodynamics of mitomycin C in cultured human bladder tumors. **Cancer Res.**, 51:3849-3856, 1991.
4. Schmittgen, T.D., Koolemans-Beynen, A., Rosol, T.J., Webb, T.E., and Au, J. L-S. Effects of 5-fluorouracil, leucovorin, and glucarate in rat colon tumor explants. **Cancer Chemother. Pharmacol.**, 30:25-30, 1992.
5. Schmittgen, T.D., Danenberg, K.D., Horikoshi, T., Lenz, H-J., and Danenberg, P.V. Effect of 5-fluoro- and 5-bromouracil substituted mRNA on the translation of human thymidylate synthase. **J. Biol. Chem.**, 269:16269-16275, 1994.
6. Schmittgen, T.D., Weaver, J.M., Badalament, R.A., Wientjes, M.G., Klein, E.A., Young, D.C., and Au, J. L-S. Correlation of human bladder tumor histoculture proliferation and sensitivity to mitomycin C with tumor pathobiology. **J. Urol.**, 152:1632-1636, 1994.
7. Yen, W.C., Schmittgen, T.D., and Au, J. L-S. Different pH dependency of mitomycin C activity in monolayer and three-dimensional cultures. **Pharmaceutical Res.**, 13:1887-1891, 1996.
8. Ju, J.F., Banerjee, D., Lenz, H.J., Danenberg, K.D., Schmittgen, T.D., Spears, C.P., Schonthal, A.H., Manno, D.J., Hochhauser, D., Bertino, J.R., Danenberg, P.V. Restoration of wild-type p53 activity in p53-null HL-60 cells confers multidrug sensitivity. **Clin. Cancer Res.**, 4:1315-1322, 1998.
9. Tirmenstein, M.A., Nicholls-Grzemeski, F.A., Schmittgen, T.D., Zakrajsek, B.A., and Fariss, M.W. Nitric oxide production by isolated rat hepatocyte suspensions. **Toxicol. Sci.**, 53:56-62, 2000.
10. Schmittgen, T.D., Zakrajsek, B.A., Mills, A.G., Gorn, V., Singer, M.J., and Reed, M.W. Quantitative RT-PCR to study mRNA decay: Comparison of endpoint and real-time PCR methods. **Anal. Biochem.**, 285:194-204, 2000.
11. Schmittgen, T.D., and Zakrajsek, B.A. Effect of experimental treatment on housekeeping gene expression: Validation by real-time quantitative RT-PCR. **J. Biochem. Biophys. Methods**, 46:69-81, 2000. > 1000 citations
12. Tirmenstein, M.A., Nicholls-Grzemeski, F.A., Schmittgen, T.D., Zakrajsek, B.A., and Fariss, M.W. Glutathione-dependent regulation of nitric oxide production in isolated rat hepatocyte suspensions. **Antioxidants and Redox Signaling** 2:767-777, 2000.
13. Livak, K.J., and Schmittgen, T.D. Analysis of relative gene expression data using real-time quantitative PCR and the $2^{-\Delta\Delta C_t}$ method. **Methods**, 25:402-408, 2001. *Twenty first most cited scientific paper of all time (Nature, October, 2014). > 90,000 citations.*

14. Schmittgen, T.D., Zakrajsek, B.A., Hill, R.E., Liu, Q., Reeves, J.J., Axford, P.D., Singer, M.J., and Reed, M.W. Expression pattern of mouse homolog of prostate-specific membrane antigen (FOLH1) in the transgenic adenocarcinoma of the mouse prostate model. **The Prostate**, 55:308-316, 2003.
15. Schmittgen, T.D., Ju, J.F., Danenberg, K.D., and Danenberg, P.V. Inhibition of pre-mRNA splicing by cisplatin and platinum analogs. **Int. J. Oncol.**, 23:785-9, 2003.
16. Schmittgen, T.D., Teske, S., Vessella, R.L., True, L.D., and Zakrajsek, B.A. Expression pattern of prostate specific membrane antigen (PSMA) and three alternatively spliced variants of PSMA in prostate cancer patients. **Int. J. Cancer.**, 107:323-329, 2003.
17. Schmittgen, T.D., Jiang, J., Liu, Q. and Yang, L. A high-throughput method to monitor the expression of microRNA precursors. **Nucleic Acids Res.**, 32:e43, 2004. *Top downloaded article (methods category) for all of 2004 from Nucleic Acids Res website.*
18. Schmittgen, T.D., Gissel, K.A., Zakrajsek, B.A., Lawrence, B.P., Liu, Q., Jupe, E.R., Lerner, M.L., Do, S.V., and Brackett, D.J. Diverse gene expression pattern during 5-fluorouridine-induced apoptosis. **Int. J. Oncol.**, 27:297-306, 2005.
19. Jiang, J., Lee, E.J., Gusev, Y and Schmittgen, T.D., Real-time expression profiling of microRNA precursors in human cancer cell lines. **Nucleic Acids Res.**, 33:5394-5403, 2005.
20. Jiang, J., Lee, E.J. and Schmittgen, T.D. Increased expression of microRNA-155 in Epstein-Barr Virus transformed lymphoblastoid cell lines. **Gene Chromosome Cancer**, 45:103-106, 2006.
21. Meng, F., Henson, R., Lang, M., Wehbe, H., Maheshwari, S., Mendell, J.T., Jiang, J., Schmittgen, T.D., and Patel, T. Involvement of human microRNAs in cholangiocarcinoma growth and response to chemotherapy. **Gastroenterology**, 130:2113-2129, 2006.
22. Guan, N., Korukonda, R., Hurgh, E., Schmittgen, T.D., Donkor, I.O. and Dalton, J.T. Apoptosis induced by novel aldehyde calpain inhibitors in human tumor cell lines. **Int. J. Oncol.**, 29:655-663, 2006.
23. Lee, E.J. and Schmittgen, T.D. Comparison of RNA assay methods used to normalize cDNA for quantitative real-time PCR. **Anal. Biochem.**, 357:299-301, 2006.
24. Lee, E.J., Gusev, Y., Jiang, J., Nuovo, G.J., Lerner, M.R., Frankel, W.L., Morgan, D.L., Postier, R.G., Brackett, D.J., Schmittgen, T.D. Expression profiling identifies microRNA signature in pancreatic cancer. **Int. J. Cancer**, 120:1046-1054, 2007. *Top downloaded article for all of 2007 from Int. J. Cancer website.*

25. Foraker, A.B., Ray, A., Da Silva, C., Bareford, L.M., Hillgren, K.M., Schmittgen, T.D., and Swaan, P.W. Dynamin 2 regulates riboflavin endocytosis in human placental trophoblasts. **Molec. Pharmacol.**, 72:553-562, 2007.
26. Calin, G.A., Liu, C.G., Ferracin, M., Hyslop, T., Sevignani, C., Cimmino, A., Wojcick, S., Shimizu, M., Fabbri, M., Picchiori, F., Lee, E.J., Liu, X., Volta, C., Zuppo, S., Herlea, V., Gramantieri, L., Lanza, G., Alder, H., Schmittgen, T.D., Volinia, S., Rassenti, L., Kipps, T.J., Negrini, M. and Croce, C.M. Ultraconserved regions encoding noncoding RNAs are altered in human leukemias and carcinomas. **Cancer Cell**, 12:215-229, 2007.
27. Gusev, Y., Schmittgen, T.D., Lerner, M.R., Postier, R.G. and Brackett, D.J. Computational analysis of biological functions and pathways collectively targeted by co-expressed microRNAs in cancer. **BMC Bioinformatics**, 8(Suppl 7): S16, 2007.
28. Lee, E.J., Baek, M., Nuovo, G.J., Chen, C. and Schmittgen, T.D. Systematic evaluation of microRNA processing patterns in tissues, cell lines and tumors. **RNA**, 14:35-42, 2007.
29. MicroRNAs Modulate Chemoresistance of Tumor Cells. Blower, P.E., Chung, J.H., Verducci, J.L., Lin, S., Park, J. K., Dai, Z., Liu, C.G., Schmittgen, T.D., Croce, C.M., Weinstein, J.N., and Sadee, W. **Molec. Cancer Ther.**, 7: 1-9, 2008.
30. Jiang, J., Aderca, I., Gusev, Y., Mettler, T.A., Nagorney, D.M., Brackett, D.J., Roberts, L.R. and Schmittgen, T.D. microRNA expression in hepatocellular carcinoma is associated with hepatitis infection, cirrhosis and patient's survival. **Clin. Cancer Res.**, 14: 419-427, 2008.
31. Nuovo, G.J and Schmittgen, T.D. Benign metastasizing leiomyoma of the lung: Clinicopathologic, immunohistochemical, and microRNA analyses. **Diag. Mol. Pathol.**, 17:145-150, 2008.
32. Hackanson, B., Bennett, K.L., Brena, R.M., Jiang, J., Maharry, K., Whitman, S.P., Schmittgen, T.D., Lübbert, M., Marcucci, G., Bloomfield, C.D. and Plass, C. Reactivation of epigenetically down-regulated microRNA-124a silences the hematopoietic transcription factor C/EBP α in acute myeloid leukemia. **Cancer Res.** 68:3142-3151, 2008.
33. Datta, J., Kutay, H., Nasser, M.W., Nuovo, G.J., Wang, B., Majumder, S., Liu, C.G., Volinia, S., Croce, C.M., Schmittgen, T.D., Ghoshal, K. and Jacob, S.T. Methylation mediated silencing of microRNA-1-1 gene in hepatocellular carcinoma: Role of miR-1 as negative regulator of tumor cell growth. **Cancer Res.**, 68:5049-5058, 2008.
34. Hunter, M.G., Ismail, N., Zhang, X., Aguda, B.D., Lee, E.J., Yu, L., Xiao, T., Schafer, J., Lee, M.L.T., Schmittgen, T.D., Nana-Sinkam, P., Jarjoura, D., and Marsh, C.B. Identification and characterization of miRNA expression in human peripheral blood microvesicles. **PLOS One**, 3(11): e3694, 2008. > 1000 citations.

35. Nuovo, G.J., Lee, E.J., Lawler, S., Godlewski, J., and Schmittgen, T.D. In situ detection of mature microRNA by ultramer-based extension. **Biotechniques**, 46:115-126, 2009.
36. Park, J.K., Lee, E.J., Esau, C., and Schmittgen, T.D. Antisense inhibition of microRNA-21 or -221 arrests cell cycle, induces apoptosis, and sensitizes the effects of gemcitabine in pancreatic adenocarcinoma. **Pancreas**, 38: e190-199, 2009.
37. Wang, B., Majumder, S., Nuovo, G.J., Kutay, H., Volinia, S., Patel, T., Schmittgen, T.D., Croce, C.M., Ghoshal, K., and Jacob, S.T. Role of miR-155 at early stages of hepatocarcinogenesis induced by chlorine-deficient and amino acid defined diet in C57BL/6 mice. **Hepatology**, 50:1152-1161, 2009.
38. Li, Y., Guessous, F., DiPierro, C., Zhang, Y., Kefas, B., Johnson, E., Jiang, J., Yang, Y., Schmittgen, T.D., Lopes, B., Schiff, D., Purow, B., Abounader, R. microRNA-34a inhibits brain tumor growth by targeting multiple oncogenes. **Cancer Res.**, 69:7569-76, 2009.
39. Kefas, B., Laurey Comeau, L., Floyd, D., Seleverstov, O., Godlewski, J., Schmittgen, T.D., Jiang, J., DiPiero, C., Li, Y., Chiocca, E.A., Lee, J., Fine, H., Abounader, R., Lawler, S. and Purow, B. The neuronal microRNA miR-326 acts in a feedback loop with Notch and has therapeutic potential against brain tumors. **J. Neurosci.**, 29:15161-68, 2009.
40. Nuovo, G.J., Wu, X., Volinia, S., Yan, F., di Leva, G., Chin, N., Nicol, A.F., Jiang, J., Otterson, G., Schmittgen T.D., Croce, C.M. Strong inverse correlation between microRNA-125b and human papillomavirus DNA in productive infection. **Diagn. Mol. Pathol.**, 19:135-43, 2010.
41. Narayanan, R., Jiang, J., Gusev, Y.D., Jones, A., Kearbey, J.D., Miller, D.D., Schmittgen, T.D., and Dalton, J.T. microRNAs are mediators of androgen action in prostate and muscle. **PLoS ONE** 5(10): e13637, 2010.
42. Henry, J.C., Park, J.K., Jiang, J., Nagorney, D.M., Roberts, L., Banerjee, S. and Schmittgen, T.D. miR-199a-3p targets CD44 and reduces proliferation of CD44 positive hepatocellular carcinoma cell lines. **Biochem. Biophys. Res. Comm.**, 403:120-125 (2010).
43. Park, J.K., Henry, J.C., Jiang, J., Esau, C., Lerner, M.R., Postier, R.G., Brackett, D.J. and Schmittgen, T.D. miR-132 and miR-212 are increased in pancreatic adenocarcinoma and target the retinoblastoma tumor suppressor. **Biochem. Biophys. Res. Comm.**, 2011 Mar 25;406(4):518-23.
44. Park, J.K., Kogure, T., Nuovo, G.J., Jiang, J., Phelps, M.A., He, L., Kim, J.H., Croce, C.M., Patel, T., and Schmittgen, T.D. Silencing of miR-221 with anti-microRNA oligonucleotides is an effective therapeutic for hepatocellular carcinoma. **Cancer Res.**, 71:7608-7616 (2011).
45. Concomitant dysregulation of microRNAs miR-151-3p and miR-126 correlates with improved survival in resected cholangiocarcinoma. McNally, M.E., Collins, A., Wojcik, S.E.,

- Liu, J., Henry, J.C., Jiang, J., Schmittgen, T.D., Bloomston, M. **HPB** (Oxford). 2013 Apr;15(4):260-4. 2012.
46. Ferdin, J., Wu, X., Nishida, N., Nicoloso, M.S., Maitri, N., Shah, Y., Devlin, C., Ling, H., Shimizu, M., Kumar, K., Cortez, M.A., Ferracin, M., Bi, Y., Yang, D., Czerniack, B.A., Zhang, W., Schmittgen, T.D., Voorhoeve, M.P., Reginato, M.J., Negrini, M., Davuluri, R.V., Kunej, T, Ivan, M. and Calin, G.A. HINCUTs in Cancer: Hypoxia-Induced Non-Coding Ultraconserved Transcripts. **Cell Death Differentiation**, 1-13, 2013.
47. Elgamal, O.A., Park, J.K., Gusev, Y., Azevedo-Pouly, A.C., Jiang, J. Roopra, A., and Schmittgen, T.D. Tumor suppressive function of miR-205 in breast cancer is linked to HMGB3 regulation. **PLoS One**, 8:10, e764022013, 2013.
48. Collins, A.L., Wojcik, S., Liu, J., Frankel, W.L., Alder, H., Yu, L., Schmittgen, T.D., Croce C.M. and Bloomston, M. A Differential microRNA profile distinguishes cholangiocarcinoma from pancreatic adenocarcinoma. **Ann Surg Oncol**. 21(1):133-8, 2013.
49. Azevedo-Pouly, A.C.P., Elgamal, O.A and Schmittgen, T.D. RNA isolation from mouse pancreas, a ribonuclease-rich tissue. **J. Vis. Exp.**, (90) e51779, 2014.
50. Pandharkar, T., Zhu, X., Mathur, R., Jiang, J., Schmittgen, T.D., Shaha, C. and Werbovetz, K. Antileishmanial. Mechanism of Action of the Arylimidamide DB766: Azole Interactions and Role of CYP5122A1. **Antimicrobial Agents and Chemotherapy**, 14 Jun 2.: AC.02405-14, 2014. PMID: 24890590. PMCID: PMC4135980.
51. Dietary apigenin reduces LPS-induced expression of miR-155 restoring immune balance during inflammation. Arango, D., Diosa-Torol, M., Rojas-Hernandez, L.S., Schwartz, S., Mo, X., Jiang, J., Schmittgen, T.D. and Doseff, A.I. **Molec. Nutrition Food Res.**, Apr;59(4):763-72, 2015. PMID: 25641956. PMCID: In process.
52. Effects of local structural transformation of lipid-like compounds on delivery of messenger RNA. Li, B., Luo, X., Deng, B., McComb, D.W., Jiang, J., Schmittgen, T.D., and Dong, Y. **Sci. Reports**, 2016 Feb 26;6:22137. PMID: 26916931. PMCID: PMC4768262.
53. Rosas, L., Elgamal, O.A., Mo, X., Phelps, M.A., Schmittgen, T.D. and Papenfuss, T.C. In vitro Immunotoxicity Assessment of Culture-Derived Extracellular Vesicles in Human Monocytes. **J. Immunotoxicol**. 2016 Apr 14:1-14.
54. Globally increased ultraconserved noncoding RNA expression in pancreatic ductal adenocarcinoma. Jiang, J., Azevedo-Pouly, A.C.P., Redis, R.S., Lee, E.J., Gusev, Y., Allard, D., Sutaria, S., Badawi, M., Elgamal, O.A., Brackett, D.J., Lerner, M.R., Calin, G.A. and Schmittgen, T.D. **Oncotarget**, 2016.

55. Kim, J.H., Park, J.K., Jiang, J., Badawi, M., Mo, X., Nagorney, D.M., Roberts, L.R. and Schmittgen, T.D. Anti-Invasion and anti-migration effects of miR-199a-3p in hepatocellular carcinoma are due in part to targeting CD151. **Int. J. Oncol.**, 49(5):2037-2045, 2016.
56. Han, S., Gonzalo, D.H., Feely, M., Behrns, K.E., McDowell, L.L., Delitto, D., Beveridge, M., Zhang, D'Y., Thomas, R., Trevino, J.G., Schmittgen, T.D., and Hughes, S.J. Co-culture induced miR-205 and miR-200 family in tumor-associated stromal cells lead to cytokine production. **Oncotarget**, 2016.
57. microRNA profile in the KC mouse model of pancreatic adenocarcinoma, generation of triple gene knockout is embryonic lethal. Azevedo-Pouly, A.C.P., Sutaria, D.S., Jiang, J., Elgamal, O.A., Allard, D., Grippo, P., Coppola, E. and Schmittgen, T.D., **Functional & Integrative Genomics**, 2016.
58. Ghosh, A., Dasgupta, D., Ghosh, A., Roychoudhury, S., Ray, S., Datta, S., Agarwal, S., Gupta, S., Chowdhury, A., Schmittgen, T.D., Banerjee, S. Curbing multiple components of tumor microenvironment hsa-miR-199a-3p impedes cell to cell crosstalk to prevent hepatocellular carcinoma. **Cell Death Disease**, 30;8(3):e2706, 2017.
59. Kim, J., Jiang, J., Badawi, M., Schmittgen, T.D. miR-221 regulates CD44 in hepatocellular carcinoma through the PI3K-AKT-mTOR pathway. **Biochem. Biophys. Res. Commun.**, 487(3):709-715, 2017.
60. Zhu, X., Badawi, M., Pomeroy, S., Sutaria, D.S., Xie, Z., Baek, A., Jiang, J., Elgamal, O.E., Mo, X., La Perle, K., Chalmers, J., Schmittgen, T.D. and Phelps, M.A. Comprehensive toxicity and immunogenicity studies reveal minimal effects in mice following sustained dosing of extracellular vesicles derived from HEK293T cells. **J. Extracellular Vesicles**, 6, 1324730, 2017.
61. Sutaria, D.S., Jiang, J., Elgamal, O.A., Pomeroy, S.M., Badawi, M., Zhu, X., Pavlovicz, R., Azevedo-Pouly, A.C.P., Chalmers, J., Li, C., Phelps, M.A. and Schmittgen, T.D. Low active loading of cargo into engineered extracellular vesicles results in inefficient miRNA delivery. **J. Extracellular Vesicles**, 6, 1333882, 2017.
62. Sutaria, D.S., Jiang, J., Azevedo-Pouly, A.C.P., Lee, E.J., Brackett, D.J., Lerner, M.R., Vandesompele, J., Mestdagh, P., and Schmittgen, T.D. Expression profiling identifies LncRNA HNRNPU-AS1 with oncogenic properties in pancreatic ductal adenocarcinoma. **Non-Coding RNA** 2017, 3(3), 24; doi:[10.3390/ncrna3030024](https://doi.org/10.3390/ncrna3030024) - 25 August 2017.
63. Park, J.K., Doseff, A.I. and Schmittgen, T.D. microRNAs targeting caspase-3 and -7 in pancreatic cancer. **Int. J. Molec. Sci.**, 19(4) E1206, 2018.
64. Badawi, M., Jihye Kim, J., Dauki, A., Sutaria, D., Motiwala, T., Reyes, R., Wani, N., Kolli, S., Jiang, J., Coss, C.C., Jacob, S.T., Phelps, M.A., and Schmittgen, T.D. CD44 positive and

sorafenib insensitive hepatocellular carcinomas respond to the ATP-competitive mTOR inhibitor INK128. **Oncotarget**, 9 (40) 26032-26045, 2018.

65. Sutaria, D.S., Jiang, J., Azevedo-Pouly, A.C., daSilva, L., Bray, J., Fredenburg, K., Liu, S., Lu, J., Torres, C., Mancinelli, G., Grippo, P.J., Coppola, E and Schmittgen, T.D. Knockout of acinar enriched microRNAs in mice promote duct formation but not pancreatic cancer. Manuscript accepted for **Nature Sci. Reports**, 2019.

BOOK CHAPTERS, REVIEWS & TECHNICAL REPORTS

1. Schmittgen, T.D. Quantitative gene expression by real-time PCR: A complete protocol, in Real-time PCR, M.T. Dorak, Editor. 2006, Taylor and Francis: New York. p. 127-137.
2. Schmittgen, T.D. Quantitative Real-Time PCR. Application Note, NanoDrop Technologies, 2006.
3. Barbarotto, E., Schmittgen, T.D. and Calin, G.A. microRNAs and cancer: Profile, Profile, Profile. *Int. J. Cancer*. 122:969-977(2007).
4. Schmittgen, T.D., E.J. Lee, and J. Jiang, High-throughput real-time PCR. *Methods Mol Biol*. 429:89-98 (2008).
5. Schmittgen, T.D., Lee, E.J., Jiang, J., Yang, L., Elton, T.S. and Chen, C. Real-time PCR quantification of precursor and mature microRNA. *Methods*, 44:31-38 (2008).
6. Schmittgen, T.D., and Livak, K.J. Analyzing real-time PCR data by the comparative CT method. *Nature Protocols*, 3:1101-1108, 2008. *>10,000 citations*.
7. Schmittgen, T.D. Regulation of microRNA processing in development, differentiation and cancer. *J. Cell. Mol. Med.*, 12:1811-1819, 2008.
8. Nana-Sinkam, S.P., Hunter, M.G., Nuovo, G.J., Schmittgen, T.D., Gelinias, R., Galas, D., Marsh, C.B., Integrating the microRNome into the study of lung Disease. *Amer. J. Resp. Critical Care Med.*, 179(1):4-10, 2009.
9. Nuovo, G.J., Elton, T.S., Nana-Sinkam, P., Volinia, S., Croce, C.M. and Schmittgen, T.D. A methodology for the combined in situ analyses of the precursor and mature forms of microRNAs and correlation with their putative targets. *Nature Protocols*, 4:107-115, 2009.
10. Schmittgen, T.D. New possibilities. Thomas D Schmittgen at the College of Pharmacy, Ohio State University, discusses the potential of serum microRNAs as biomarkers. *European BioPharmaceutical Review*, 60-63, April, 2009.
11. Gusev, Y., Schmittgen, T.D., Lerner, M and Brackett, D.J. Analysis of microRNA profiling data with systems biology tools. In: *microRNA profiling in cancer: a bioinformatics*

- perspective, Y. Gusev, Editor. 2009, Pan Stanford/World Scientific Publishing, Hackensack, NJ. p. 189-218.
12. Schmittgen, T.D. miR-31: a master regulator of metastasis? *Future Oncol.* 2010 Jan;6(1):17-20.
 13. Jiang, J., Lee, E.J., Piper-Hunter, M., Marsh, C.B., and Schmittgen, T.D. High throughput profiling of mature microRNA by real-time PCR. In: *RNA interference methods. In RNA Interference Techniques, Neuromethods, Vol. 58, S. Harper, Editor. Humana/Springer.* pp. 113-121, 2011.
 14. Nuovo, G.J., Nana-Sinkam, P., Crawford, M., and Schmittgen, T.D. In Situ Detection of MicroRNAs in Paraffin Embedded, Formalin Fixed Tissues: Different Methodologies and Co-Localization with Possible Targets. In: *RNA interference methods, Neuromethods, Vol. 58, S. Harper, Editor. Humana/Springer.* pp. 123-139, 2011.
 15. Schmittgen, T.D. GEN Tech Tips PCR, *Genetic Engineering News*, April 15, 2011.
 16. Henry, J.C., Azevedo, A.C.P., and Schmittgen, T.D. microRNA replacement therapy for cancer. *Pharm. Res.*, 28:3030-3042, 2011.
 17. Braconi, C., Henry, J.C., Kogure, T., Schmittgen, T. and Tushar Patel, T. The role of microRNAs in human liver cancers. *Semin. Oncol.*, 38(6) 752-763, 2011.
 18. Park, J.K., and Schmittgen, T.D. MicroRNAs in Cell Death and Cancer. In: *Cell Death Signaling in Cancer Biology and Treatment. D. E. Johnson, Editor. Springer Science*, 117-136, 2013.
 19. Schmittgen, T.D. Microbiomarkers with big effect in CLL. *Blood.* 12;122(11):1843-4, 2013.
 20. Azevedo-Pouly, A.C.P. and Schmittgen, T.D. Pathology, genetic alterations, and targets of differentially expressed microRNAs in pancreatic cancer. *Gastrointestinal Cancer: Targets and Therapy* 2014:4 75-87.
 21. Sutaria, D.K., Badawi, M. and Schmittgen, T.D. Achieving the promise of therapeutic extracellular vesicles: The devil is in the details of therapeutic loading. *Pharm. Research.*, 34(5):1053-1066, 2017.
 22. Scarton, L., Yoon, S., Oh, S., Agyare, E., Trevino, J., Han, B., Lee, E.S., Setiawan, V.W., Permuth, J.B., Schmittgen, T.D., Odedina, F.G., and Wilkie, D.J. Pancreatic cancer related health disparities: A commentary. *Cancers*, 10(7), 235, 2018.
 23. Schmittgen, T.D. miRNA cargo as mediator of immune escape mechanisms in neuroblastoma. *Cancer Res.* 79(7):1293-1294 (2019).

PATENTS

1. U.S. Patent No. 8,192,938. Methods for quantifying microRNA precursors, Inventor: T.D. Schmittgen, issued on June 5, 2012.
2. microRNA expression profile associated with pancreatic cancer. T.D. Schmittgen and D.J. Brackett, Publication number: US 2010/0286232 A1, Filing date: Mar 2, 2007.

INDICATORS OF RESEARCH PRODUCTIVITY

Combined Past and Current Funding as PI/mPI (1995-present)				
Role	Direct Costs			Total of Direct & Indirect Costs
	NIH	Other Agencies	Total	
P.I.	\$4,044,112	\$606,000	\$4,650,112	\$6,765,152

Citations: 123,883, **H-index** = 47 (Google Scholar)

ABSTRACTS (since 2010)

40. Narayanan, R., Jiang, J., Gusev, Y., Jones, A., Miller, D.D., Schmittgen, T.D. and Dalton, J.T. DHT Promotes Muscle and Prostate Growth through a Positive Feedback Loop Involving Androgen Receptor, microRNA and Corepressors. *Endocrine Rev.*, 31(3), S2-S2, Suppl. 1, 2010.
41. Park, J.K., Jiang, J., Gusev, Y., Lerner, M.R., Brackett, D.J., Schmittgen, T.D. Regulation of Rb1 and caspase 3/7 by miR-17-5p, miR-132/-212, and miR-337-3p: Oncogenic role of miRNAs in pancreatic cancer. *Proc. Am. Assoc. Cancer Res.*, 51: 2106, 2010.
42. Azevedo, A.C., Jiang, J., Lee, E.J., Gusev, Y., Allard, D., Tuveson, D.A., Calin, G.A., and Schmittgen, T.D. Global increase in ultraconserved non-coding RNA expression in pancreatic adenocarcinoma. *Proc. Am. Assoc. Cancer Res.*, 52: 1179, 2011.
43. Henry, J.C., Park, J.K., Jiang, J., Nagorney, D.M., Roberts, L., Banerjee, S. and Schmittgen, T.D. miR-199a-3p targets CD44 and reduces proliferation of CD44 positive hepatocellular carcinoma cell lines. *Proc. Am. Assoc. Cancer Res.*, 52: 1183, 2011.
44. Park, J.K., Kogure, T., Nuovo, G.J., Jiang, J., Phelps, M.A., He, L., Kim, J.H., Croce, C.M., Patel, T., and Schmittgen, T.D. Silencing of miR-221 with anti-microRNA oligonucleotides is an effective therapeutic for hepatocellular carcinoma. *Proc. Am. Assoc. Cancer Res.*, 52: 4711, 2011. *Selected for oral presentation.*

45. Lin, S.H., Jiang, J., Kuo, C.T., Ye, W., Xu, P., Li, H., Liu, J.Y., Zhong, S., Schmittgen, T.D., and Lin, Y.C. Differential miR-141 expression in primary cultured human breast cancer epithelium (PCHBCEs) and normal adjacent part epithelium (PCHBNEs) correlates with tumor suppressor protein tyrosine phosphatase γ (PTP γ). *Proc. Am. Assoc. Cancer Res.*, 52: 3956, 2011.
46. Banerjee, J., Hussain, S., Biswas, S., Schmittgen, T. D., Khanna, S., Roy, S., and Sen, C. K. microRNA-1 induction in ischemic wounds attenuates keratinocyte migration via an aquaporin-3 mediated pathway. *Wound Repair Regeneration*, 19(2), A12-A12, 2011.
47. Banerjee, J., Hussain, S.R, Biswas, S., Schmittgen, T., Khanna, S., Roy, S., and Sen, C.K. microRNA-1 induction in ischemic wounds attenuates keratinocyte migration via an aquaporin-3 mediated pathway. 2012 Translational to Clinical Wound Care Conference.
48. Elgamal, O., Park, J.K., Schmittgen, T.D. miR-205 functions as a tumor suppressor in breast cancer by targeting HMGB3. *Proc. Amer. Assoc. Cancer Res.*, 54:4204, 2013.
49. Azevedo-Pouly, A.C., Jiang, J., Sutaria, D., Schmittgen, T.D. Regulation of NRSF/REST by miR-217; Implications during pancreatic acinar ductal trans-differentiation. *Proc. Amer. Assoc. Cancer Res.*, 54:4187, 2013.
50. Braconi, C., Valeri, N., Gasparini, P., Jiang, J., Kogure, T., Croce, C., Schmittgen, T., and Patel, T. Transcribed ultraconserved regions are aberrantly expressed and can be modulated by interleukin 6 in cholangiocarcinoma. *The Lancet*, Volume 381, Issue, Page S26, 27 February 2013.
51. Sutaria, D.S., Jiang, J., Elgamal, O.A., Azevedo-Pouly, A.C., Pavlovicz, R., Li, C., Phelps, M.A. and Schmittgen, T.D. Engineering of microRNA loaded targeted microvesicles for cancer therapy. Presented at NIH exRNA consortium bi-annual meeting. Rockville, MD, May, 2014.
52. Kim, J., Phelps, M.A. and Schmittgen, T.D. Development of a Bioanalytical Method for PK/PD of Therapeutic miRNA Mimics. AAPS Annual Meeting, November 2-6, 2014, San Diego.
53. Sutaria, D.S., Jiang, J., Elgamal, O.A., Azevedo-Pouly, A.C.P., Pavlovicz, R.E., Li, C., Phelps, M.A. and Schmittgen, T.D. Engineering of hairpin loop enhances the loading of endogenously expressed pre-miRNA into extracellular vesicles. *Proc. Amer. Assoc. Cancer Res.*, 57:2068, 2016.
54. Han, S., Belsare, S., Zhang, D.Y., Beveridge, M., Rinaldi, C., Trevino, J.G., Schmittgen, T.D. and Hughes, S.J. Exosomal delivery of stroma-derived miR-145 inhibits pancreatic cancer cell proliferation. *Proc. Amer. Assoc. Cancer Res.*, 58:4322, 2017.
55. Badawi, M., Kim, J., Sutaria, D., Motiwala, T., Reyes, R., Wani, N., Jacob, S., Phelps,

- M., and Schmittgen, T.D. CD44 positive and sorafenib resistant hepatocellular carcinomas respond to the ATP-competitive mTOR inhibitor INK128. *Proc. Amer. Assoc. Cancer Res.*, 58:141, 2017.
56. Sutaria, D.S., Jiang, J., Azevedo-Pouly, A-C., P., Lee, E.J., Lerner, M.R., Brackett, D.J., Vandesompele, J., Mestdagh, P., and Schmittgen, T.D. Expression profile identified LncRNA HNRNPU-AS1 with oncogenic properties in pancreatic ductal adenocarcinoma. Poster presented at 2nd International Symposium on Frontiers in Molecular Science Non-Coding RNAs and Epigenetics in Cancer. Basel, Switzerland, June 2017.
57. daSilva, L., Mathews, J., Li, C., Luesch, H., and Schmittgen, T.D. Drug screens targeting the early events in the development of pancreas cancer. University of Florida Drug Discovery Symposia, Gainesville, Florida, September, 2017.
58. Tomkovich, S., Gharaibeh, R.Z., Dejea, C.M., Pope, J.L., Jiang, J., Winglee, K., Gauthier, J., Newsome, R.C., Yang, Y., Mühlbauer, M., Fodor, A.A., Schmittgen, T.D., Sears, C.L. and Jobin, C. Microbial Activities Associated with Human Colon Mucosal Biofilms Change mRNAs and microRNAs to Promote Carcinogenesis. *ASM Microbe*, June, 2018.
59. Nassiri Koopaei, N., Pomeroy, S.M., Phelps, M.A., and Schmittgen, T.D. Pilot scale and GMP compliant production and purification process of extracellular vesicles. Annual Meeting of the International Society of Extracellular Vesicles, Barcelona, Spain, May, 2018.
60. da Silva, L., Matthews, J., Li, C., Luesch, H., and Schmittgen, T.D. Three dimensional cellular drug screen identifies novel inhibitors of pancreatic acinar ductal metaplasia. *Pancreatic Cancer: Advances in Clinical Care*, AACR, Boston, September, 2018.
61. Bray, J., Elgamal, O., Azevedo-Pouly, A.C., Jiang, J, and Schmittgen, T.D. Evaluation of the Transcriptional Repressor REST during pancreas injury and acinar transdifferentiation. *Pancreatic Cancer: Advances in Clinical Care*, AACR, Boston, September, 2018.
62. Differential expression of noncoding RNAs in black compared with white laryngeal cancers K. Fredenburg, J. Jiang, T.D. Schmittgen. *Proc. Amer. Assoc. Cancer Res.*, 60:3583, 2019.
63. Repression of neuronal genes protects the pancreas from certain injuries and aberrant plasticity. J.K. Bray, O. Elgamal, L. Da Silva, D. Sutaria, X. Liu, K. Fredenburg, T.D. Schmittgen. *Proc. Amer. Assoc. Cancer Res.*, 60:5222, 2019.

RESEARCH INTERESTS

- Exosomes as drug delivery vesicles.
- RNA-directed therapeutics for cancer.
- Development of noncoding RNA biomarkers for cancer and neuropathic pain.
- Role of noncoding RNAs in cancer.

ADVISING/MENTORING ACTIVITY**Undergraduate Research Student Advisor:**

1996-1997	Cindi Reeder (WSU, Biology) Recipient of Howard Hughes Undergraduate Student Research Award
1996-1997	Brian Zakrajsek (WSU, Biology)
1999	William King (WSU, Pharmacy) Recipient of AACP Gateway Fellowship
2004-2005	Isaac Boakye (OSU, Pharm. Sciences) Undergraduate Honors Thesis
2005-2007	Myung Won Baek (OSU, Biology)
2006-2007	Matthew Welsch (OSU, Biochemistry)
2007-2008	Jonathan Vang (OSU, Pharmaceutical Sciences)
2009-2010	Lindsey Jones (University of Notre Dame) Recipient of Summer Undergraduate Research Fellowship
2009	Sin Chu (Case Western Reserve University)
2010-2011	Lucas Serdar (OSU, Pharmaceutical Sciences) Recipient of Summer Undergraduate Research Fellowship
2013-2014	Andrea Haughtvedt
2013-2014	Luke Bramlage
2016-2017	Katlyn Ethridge (UF, Nutrition)
2016-2017	Zac Doran (UF, Pharmacy)
2017	Emily Wilson (UF, SURF program)
2017-2019	Madeline Borcyk (UF, Biology)
2018	Gamze Bulut (UF, Pharmacy)
2019	Jonathan Costro (UF, Pharmacy)

Graduate Students:

<u>Student</u>	<u>Role</u>
2019-date	Gamze Bulut Major Advisor
2019-date	Andrew Brock Major Advisor
2019-date	Corey Perkins Major Advisor
2017-date	Nasser Nassiri Koopaei Major Advisor
2016-date	Julie Bray Major Advisor
2016-date	Lais DaSilva Major Advisor
2016-2018	Saima Subhani Major Advisor, transferred labs, 10/2018
2013-2017	Mohamed Badawi Major Advisor-Ph.D. received 12/2017
2012-2016	Dhruvit Sutaria Major Advisor-Ph.D. received 12/2016
2011-2016	Ola Elgamal Major Advisor-Ph.D. received 4/2016
2010-2015	Jihye Kim Major Advisor-Ph.D. received 8/2015
2007-2013	Ana Clara Azevedo Major Advisor-Ph.D. received 8/2013
2011-2012	Miranda McClain Major Advisor-Masters received 12/2012
2010-2012	Jon C. Henry Major Advisor-Masters received 6/2012
2006-2012	Jong-Kook Park Major Advisor-Ph.D. received 3/2012
2008-2015	Ji Hye Kim Major Advisor-Masters received 6/2010

2004-2008	Eun Joo Lee	Major Advisor-Ph.D. received 7/2008
2003-2007	Liuqing Yang	Major Advisor-Masters received 3/2008
2000-2003	Qian Liu	Major Advisor- Masters received 5/2003

Noteworthy accomplishments of graduate students for whom I was advisor of record.

Qian Liu, best poster, annual research meeting of Pharmacology & Toxicology Graduate Students, 2000.

Qian Liu, Dorothy Otto Kennedy Graduate Student Award in Cancer Research, 2000.

Qian Liu Dorothy Otto Kennedy Graduate Student Award in Cancer Research, 2001.

Eun Joo Lee, recipient of the 2006-2007 Proctor and Gamble fellowship in pharmacogenomics.

Eun Joo Lee, recipient of Scholar-in-Training travel award, American Association for Cancer Research, 2006.

Ana Clara Azevedo, recipient of NIH F31 predoctoral fellowship, 2009-2013.

Jon C. Henry, recipient of NIH T32 Oncology Training Grant, 2010-2012.

Jong-Kook Park, first place poster, Experimental Therapeutics Section. OSU Comprehensive Cancer Center Annual Meeting, 2011.

Ana Clara Azevedo, recipient of Ray travel award, Council of Graduate Students, Ohio State University, 2011.

Jon C. Henry, first place presentation, Columbus Surgical Society, 2011.

Jon C. Henry, best poster in Clinical and Translational Sciences, OSU College of Pharmacy Research Day, 2011.

Ana Clara Azevedo, best poster in Clinical and Translational Sciences, OSU College of Pharmacy Research Day, 2012.

Ola Elgamal, third place poster, Graduate Student Category, OSU College of Pharmacy Research Day, 2013.

Mohamed Badawi, Frank Fellowship in Pharmaceutics, 2013-date.

Jihye Kim, Lilly Fellowship in PK/PD, 2013-14.

Matt Dixon, Richard Summer Fellowship, College of Pharmacy.

Dhruvit Sutaria, second place poster, Graduate Student Category, OSU College of Pharmacy Research Day, 2014.

Noteworthy accomplishments of graduate students for whom I was advisor of record (cont'd).

Jihye Kim, AFPE Fellowship, 2014-15.

Dhruvit Sutaria, second place poster, Graduate Student Category, OSU College of Pharmacy Research Day, 2015.

Dhruvit Sutaria, best poster, Pre-doctoral Student Category, University of Florida Health Science Cancer Center Research Day, 2016.

Julie Bray, recipient of NIH F31 predoctoral fellowship, 2017-2020.

Julie Bray, attendee, Cold Springs Harbor Workshop in Pancreatic Cancer, June 2017.

Julie Bray, best poster, Mechanisms of oncogenesis category, University of Florida Health Science Cancer Center Research Day, 2017.

Julie Bray, Graduate Student Education Initiative Award, College of Medicine, University of Florida, 2018.

Nasser Nassiri Koopaei, First place, UF Warrington College of Business, Big Idea Competition, 2018.