Gary A. Piazza, Ph.D.
W.W. Walker Endowed Professor
Department Head, Drug Discovery and Development
Director, Harrison College of Pharmacy Cancer Research Center
Auburn University
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Ph.D. in pharmacology with over 35 years of experience in cancer research and interests in drug discovery and development relating to experimental anticancer therapeutics.

PROFESSIONAL EXPERIENCE

Endowed Professor and Department Head **March 2021-current**
Director, Cancer Research Center
Harrison College of Pharmacy
Department of Drug Discovery and Development
Auburn University, AL

As department head and senior faculty member, I serve as an administrator and professor in the Drug Discovery and Development Department in the Harrison College of Pharmacy at Auburn University. I am responsible for faculty development and recruitment, instructional program development and quality enhancement, coordination of departmental research and service programs, evaluation of personnel, and, through the dean, represents the department's interest to units inside and outside the University. I maintain relationships with faculty, students, other administrators, University councils and committees, alumni, professional organizations, and scientific collaborators. In conjunction with the school dean, I manage the department's annual budget request and expenditures of allocated funds and other resources available to the department. I also direct my research group and serve as PI on three R01, engaged in multiple scientific collaborations, and have aspirations to bring three distinct drug candidates to clinical trials.

Professor of Oncologic Sciences and Pharmacology **2011-2021**
Program Director, Chemoprevention and Experimental Therapeutics
Chief, Drug Discovery and Development Research Center
University of South Alabama Mitchell Cancer Institute
National Academy of Inventors Fellow

Leadership and mentoring responsibility for a multidisciplinary team with expertise in medicinal chemistry, biochemistry, molecular and cell biology, and mouse tumor models. Established a research platform involving a chemical-biology approach and the synthesis of a custom library of indenes structurally related to the cancer chemopreventive drug, sulindac, to identify novel vulnerabilities of cancer cells that occur during early stages of malignancy. Inhibitors targeting RAS directly or β-catenin indirectly *via* inhibition of PDE10, a novel oncogenic protein, emerged with highly potent and selective cancer cell growth inhibitory activity and exceptionally strong *in vivo* anti-tumor activity in multiple, extremely aggressive mouse tumor models. Principal investigator on multiple NCI R01 grants focused on the development of these compounds for colorectal, lung, ovarian, and breast cancers.

Principal Scientist **2003-2011**
Program Director, Southern Research Molecular Libraries Screening Center

Adjunct Associate Professor of Pharmacology and Toxicology, UAB
Adjunct Associate Professor of Biochemistry and Molecular Genetics, UAB
Senior Scientist UAB Comprehensive Cancer Center School of Medicine
Southern Research Institute, Birmingham AL
Established an independent NIH funded research program relating to develop novel sulindac derivatives for colorectal cancer chemoprevention. Served as the Program Director for a NIH molecular libraries screening center involving assay development, high throughput screening, synthetic chemistry, and cheminformatics. Managed a cell biology laboratory that evaluated experimental drugs for numerous pharmaceutical companies and government agencies.

Director of Pharmacology **2001 - 2003**
Adjunct Associate Professor of Pharmacology
CTRC Institute for Drug Development, San Antonio, TX
University of Texas Health Sciences Center, San Antonio, TX

Leadership responsibility for a multidisciplinary group of scientists conducting contract-based research for pharmaceutical companies composed of multiple laboratories including medicinal chemistry, tumor cell biology, *in vivo* tumor efficacy models, target discovery, and biomarkers. Research focused primarily on *in vivo* testing of drugs in clinical trials at CTRC.

Senior Director of Biology **1993 - 2001**
Director of Cell Biology
Cell Pathways Inc., Horsham, PA

- Led the preclinical development of sulindac sulfone (exisulind) that completed phase 3 clinical trials in familial adenomatous polyposis patients.
- First to publish in 1995 (*Cancer Research*) that NSAIDs induce apoptosis of cancer cells by a cyclooxygenase-independent mechanism.
- Established an integrated anticancer drug discovery and development program involving biochemical assays, cell-based screens, and evaluation of antitumor efficacy in animal models lung, colon, bladder and breast cancer.
- Investigated the biochemical and cellular basis for the antineoplastic properties of nonsteroidal anti-inflammatory drugs and discovered a novel cyclooxygenase-independent pathway of apoptosis induction involving phosphodiesterase inhibition, cGMP elevation, and suppression of oncogenic β-catenin signaling.

Staff Scientist, Project Leader **1989 - 1993**
Procter & Gamble Co., Miami Valley Laboratories, Cincinnati, OH

- Led basic research initiative to explore novel strategies for skin and hair regeneration.
- Investigated the effects of retinoids on human keratinocyte proliferation and differentiation.
- Investigated regulatory mechanisms of TGF-alpha, TGF-beta and IGF expression.
- Developed cell culture methods to grow hair follicle epithelial matrix cells and demonstrated capacity to produce hard keratins and retain organoid characteristics.
- Developed IHC and RT-PCR methods to quantify growth factor expression in skin.

Assistant Research Oncologist **1987 – 1989**
Depts. of Medical Oncology and Pathology (Dr. Douglas Hixson)
Brown University/Rhode Island Hospital, Providence RI

- Studied a new function of the protease, dipeptidylpeptidase IV, as a modulator of hepatocyte-extracellular matrix (fibronectin) interactions.
- Utilized cultured rat hepatocytes as a model for determining the role of cell surface glycoproteins in hepatocellular carcinogenesis.
- Gained scientific expertise in protease and glycoprotein biochemistry.
- Developed novel protease-substrate detection methodologies using gel electrophoresis.
- Lectured a graduate level course relating to tumor cell metastasis and invasion.

Postdoctoral Fellow **1986 - 1987**
Dept. of Pharmacology (Drs. Mark Sterns and Ken Tew)
Fox Chase Cancer Center, Philadelphia, PA

- First to isolate and characterize kinesin (ATPase involved in microtubule-directed transport) from cultured human prostate tumor cells. Characterized kinesin from normal and neoplastic tissues by functional, structural, and immunological analysis.
- Developed skills in enzymology, immunofluorescence microscopy and computer-based image enhancement techniques.
- Developed knowledge in tumor cell biology, microtubules and associated proteins, intracellular motility, and kinesin.

Graduate Student **1981 – 1986**
Dept. of Pharmacology (Dr. Robert Wallace)
University of Alabama, Birmingham, AL

Thesis: A novel function of calmodulin in the platelet cytoskeleton as a regulator of actin Polymerization

- Characterized a novel activity of calmodulin to regulate actin polymerization and provide calcium sensitivity to the platelet cytoskeleton during activation.
- Developed knowledge and research skills in protein biochemistry, enzymology, protein purification and characterization.
- Developed knowledge and research skills in signal transduction and cell biology.

EDUCATION

Ph.D. Pharmacology **1985**
The University of Alabama at Birmingham

Bachelor of Biology and Psychology **1981**
Dominican University, Chicago, IL

PROFESSIONAL AFFILIATIONS

Member, American Association of Cancer Research (Since 1996)
Fellow, National Academy of Inventors (Since 2016)

ACTIVITIES AND HONORS

- *Scientific Review Panel,* NCI SPORE, 2022
- *Scientific Review Panel,* NCI Developmental Therapeutics, 2021
- *Chair and reviewer,* NCI drug development R21 grant applications, 2018
- *Scientific Review Panel,* NCI PREVENT, 2018 - current
- *Scientific Review Panel,* NCI, Molecular Oncogenesis, 2018
- *Scientific Review Panel,* NCI, Chemo-dietary prevention permanent member, 2007 – 2015

- *Scientific Review Panel*, NCI SBIR/STTR, Cancer biotherapeutics dev., 2017-current
- *Scientific Review Panel*, Veterans Administration, 2015 - current
- *Scientific Review Panel*, Department of Defense, 2015 - current
- *Scientific Review Panel*, American Cancer Society, Cancer drug discovery, 2014
- *Scientific Review Panel*, NCI SBIR/STTR, Cancer drug disc. and dev., 2009-2015
- *Scientific Review Panel*, NCI Chemoprevention Branch, 1997-2003
- *Scientific Review Panel*, National Human Genome Research Institute, 2004–2006
- *Scientific Review Panel,* NCI Comprehensive Cancer Center Site Visit 2008-current
- *Scientific Review Panel*, NCI Drug Discovery and Mol. Pharm. study section, 2008-2010
- *Scientific Review Panel*, NCI Program project, 2006-current
- *Scientific Review Panel*, NCI SPORE, 2011-current
- *Scientific Review Panel*, Abraham Mitchell Cancer Research Fund, 2012-2014
- *Editorial Board, Molecular Cancer Therapeutics, 2004-2007*
- *Associate Editor, Oncology Signaling, 2018-2021*
- *Editorial Board, Cellular Signaling Journal, 2018-2021*
- *Co-guest Editor, International Journal Molecular Sciences (special edition), 2018-2021*
- *Editor, Frontiers in Oncology, Molecular and Cellular Oncology Section; Special issue entitled: "Targeting the Wnt/β-catenin Signaling Pathway in Cancer", 2021-current*
- *Ad hoc reviewer for Cancer Research, Cancer Prevention Research, Clinical Cancer Research, Molecular Cancer Research, Journal Pharmacology and Experimental Therapeutics, Cellular and Molecular Life Sciences, Cancer Letters, Biochemical Pharmacology, European Journal of Clinical Investigation, Expert Opinion on Drug Safety, Carcinogenesis, and Drug Metabolism and Disposition, Cell Biology and Toxicology, Tumor Biology, Journal of Cancer Research, Cell Communication and Signaling, and Cell Proliferation, Biochemical Biophysical Acta, Journal Functional Foods, Drug Discovery Today, Arabian Journal of Chemistry, Current Cancer Drug Targets, PLOS ONE, Oncotarget, ACS Applied Materials & Interfaces, etc.*
- *Howard C. Bailey Award of Excellence in Research*, UAB Cancer Center Retreat, 2008
- *Assistant Scientist*, UAB Gregory Fleming James Cystic Fibrosis Research Center, 2011
- *Mitchell Cancer Institute Faculty Committee for Promotion and Tenure*, 2011-2014
- *Organizer*, MCI Weekly seminar series (2011-2018)
- *Director Search Committee*, Mitchell Cancer Institute (2014)
- *USA Academic Mentorship Program*, Mentor for Dr. Natalie Gassman, 2015-2016
- *Faculty Development Team,* Dr. Edmonds, UAB (2018-2021)
- *Chair*, Faculty Committee for Appointments, Promotions, and Evaluations Mitchell Cancer Institute 2015-2018
- *Mayer Mitchell Award for Excellence in Cancer Research*, Mitchell Cancer Institute, 2015
- *Faculty Senate*, University of South Alabama, elected member, and caucus leader for Mitchell Cancer Institute, 2014-2017.
- *Faculty committee,* Univ. So. Al Research and Creative Activities Committee, 2015-2016
- *Executive committee,* Auburn University, Harrison College of Pharmacy, 2021-current
- State of Alabama, Mobile Chamber of Commerce Trade Mission to Ireland and UK, 2019
- *Member*, American Association of Cancer Research (Since 1996)
- *Co-editor:* Frontiers in Oncology, "Targeting the Wnt/ß-catenin Signaling Pathway in Cancer**"**
- *Co-editor:* Elsevier, Advances in Cancer Research," RAS: Past, present, and future"
- *Inventor or co-inventor* on over 70 patent applications
- *Co-founder*, Consultant, ADT Pharmaceuticals LLC., 2014
- *Fellow,* National Academy of Inventors, 2016

TEACHING

Cancer chemotherapy for medical students (UAB, 2005-2009); cancer chemoprevention for graduate students (UAB, 2006-2009); Course Director for Drug Discovery and Development class offered to Howard Hugh UAB graduate students (Southern Research, 2010); Drug discovery for graduate students (USA. 2012-2020); Cancer chemoprevention for graduate students (USA. 2017-2020); Special topics in cancer biology; RAS inhibitors (USA. 2020); Summer internship for undergraduates (USA. 2012-2020); Honor undergraduate students (USA, 2016-2020); Summer research for medical students (USA, 2014-2020). Mentored two pharmacy research students, served as a mentor to early career pharmacy students, and served as a member of a PhD committee during 2021. Currently mentoring a Pharm. D./Ph.D. student and Ph.D. student.

MENTORING RECORD

Name	Training Period	Position mentored	Current position
Heather Tinsley, PhD	2006-2010	Graduate Student	Professor (Univ. of Montevallo, AL)
Jason Whitt, PhD	2006-2011	Graduate Student	Research Associate (UAB)
Nan Li, PhD	2008-2013	Graduate Student	Staff Scientist (NCI)
Evrim Gurpinar, PhD	2008-2013	Graduate Student	AstraZeneca (Cambridge, UK)
Jose Thaiparabil, PhD	2004-2007	Postdoctoral	Assistant Professor (Univ. Texas)
Alexandra Fajardo, PhD	2012-2014	Postdoctoral	Staff Scientist (Wood Hudson Institute)
Adam Keeton, PhD	2002-current	Postdoctoral	Assistant Professor (USA MCI)
Bing Zhu, PhD	2011-2019	Assistant Professor	Assistant Professor (USA MCI)
Yaguang Xi, PhD, MD	2011-2019	Assistant Professor	Professor and Vice Chair (LSU)
Veronica Ramirez, PhD	2012-2019	Postdoctoral	Assistant Professor (USA MCI)
Xi Chen, PhD	2010-current	Research Scientist	Assistant Professor (USA MCI)
Joshua Canzoneri, PhD	2012-current	Postdoctoral	Research Scientist (ADT Pharm)
Ashley Lindsey, PhD	2015-2017	Postdoctoral	Postdoctoral Fellow (USA)
Sara Sigler, PhD	2012-2016	Graduate Student	Research Scientist (BlinkBio Inc)
Kevin Lee, PhD	2012-2019	Graduate Student	Postdoctoral Fellow (USA MCI)
Jacob Valiyaveettil, PhD	2015-current	Res. Ass. Professor	Research Scientist (ADT Pharm)
Luciana Barnes, PhD	2014-2021	Res. Ass. Professor	Assistant Professor (USA MCI)
Yulia Maxuitenko	2016-current	Associate Professor	Associate Professor (USA MCI)
Antonio Ward, PhD	2016-2021	Postdoctoral	Research Scientist (Boston)
Tyler Mattox	2015-2020	Graduate student	Director, Molecular Sciences (Caris)
Alex Coley	2019-2021	Graduate student	2nd year Graduate student (USA MCI)
Arlet Hernandez	2020-2021	Graduate student	1st year Graduate student (USA MCI)
Austin Moore	2022-current	Graduate student	Pharm D/PhD candidate (Auburn)
Andy Huang	2022-current	Graduate student	3rd year Graduate student (Auburn)

PUBLICATIONS

9368 citations; h index 52; i10 index 134

1. **Piazza, G.A.** and R.W. Wallace (1985) "Calmodulin accelerates the rate of polymerization of human platelet actin and alters the structure of actin filaments" *Proc. Nat'l. Acad. Sci. (USA),* 82: 1683 - 1687.

2. **Piazza, G.A.** (1986) "A novel function of calmodulin in the platelet cytoskeleton as a calcium dependent regulator of actin filament assembly" *Doctoral Dissertation*, University of Alabama at Birmingham, Department of Pharmacology.

3. Wallace, R.W. and **G.A. Piazza** (1987) "Calmodulin and actin polymerization" In: *Methods in Enzymology*, (Means, A. R. and Conn, P.M.) Academic Press, New York, Vol. 139, 846 - 857.

4. **Piazza, G.A.,** Callanan, H.M. Mowery, J. and D.C. Hixson (1989) "Evidence for a novel interaction between fibronectin and rat hepatocyte dipeptidylpeptidase IV" *Biochemical Journal*, 262: 327 - 334.

5. Hong, W., **Piazza, G.A.,** Hixson, D.C. and D. Doyle (1989) "Expression of enzymatically active rat dipeptidylpeptidase IV in Chinese hamster ovary cells after transfection" *Biochemistry*, 28: 8474 - 8479.

6. Stearns, M.E. and **G.A. Piazza** (1990) "Properties of kinesin isolated from DU-145 tumor cells and brain" *Biochem. Cell Biol.*, 68: 157 - 163.

7. **Piazza, G.A.** and J.R. Ritter (1993) "Involvement of transforming growth factor-alpha and its receptor in the growth response of cultured human epidermal cells to retinoic acid" *Epithelial Cell Biology,* 2: 170 - 175.

8. **Piazza, G.A.,** Ritter, J.R. and C.A. Baracka (1995) "Lysophosphatidic acid induction of transforming growth factors types α and β: Modulation of proliferation and differentiation in cultured human keratinocytes and mouse skin". *Experimental Cell Research,* 216: 51 - 64.

9. **Piazza, G.A.,** Kulchak, Rahm, A.L. Krutzsch, M., Sperl, G., Paranka, N.S., Gross, P.H, Brendel, K., Burt, R.W., Alberts, D.S., Pamukcu, R. and D.J. Ahnen (1995) "Antineoplastic drugs, sulindac sulfide and sulfone, inhibit cell growth by inducing apoptosis" *Cancer Research*, 55: 3110 - 3116.

10. Thompson, H. J., Briggs, S., Paranka, N. S., **Piazza, G.A.,** Brendel, K., Gross, P.H., Sperl, G. S., Pamukcu, R. and D.J. Ahnen (1995) "Inhibition of mammary carcinogenesis in rats by sulfone metabolite of sulindac". *J. Natl. Cancer Inst*., 87: 1259 - 1260.

11. Thompson, H.J., Jiang, C., Lu, X., Mehta, R.G., **Piazza, G.A.,** Paranka, N.S., Pamukcu, R. and D.J. Ahnen (1997) "Sulfone metabolite of sulindac inhibits mammary carcinogenesis". *Cancer Research* 57: 267 - 272.

12. **Piazza, G.A**. and R. Pamukcu (1997) "Apoptosis induction as a mechanism for the antineoplastic properties of FGN-1, a drug for treating premalignant lesions". In: *Apoptosis; Practical Applications and Novel Therapies*. IBC Publishing Co., Boston, MA, 79-86.

13. **Piazza, G.A**., Rahm, A.K., Finn, T., Fryer, B., Li, H., Stoumen, A.L., Pamukcu, R. and D.J. Ahnen (1997) "Apoptosis primarily accounts for the growth inhibitory properties of sulindac metabolites by a mechanism independent of cyclooxygenase inhibition, cell cycle arrest, or p53 mediation". *Cancer Research* 57: 2452 - 2459.

14. **Piazza, G.A.,** Alberts, D.S., Hixson, L.J., Paranka, N.S., Bogert, C., Guillen, J.M., Brendel, K., Gross, P., Sperl, G., Ritchie, J., Burt, R. W., Ellsworth, L., Ahnen, D.J. and R. Pamukcu (1997). "Sulindac sulfone inhibits azoxymethane-induced colon carcinogenesis without reducing prostaglandin levels". *Cancer Research* 57: 2909 - 2916.

15. Arber, N., Han, E.D., Sgambato, A., **Piazza, G.,** Pamukcu, R., Ahnen, A., Delohery, T., Begemman, M., Wegharst, Kim, N.H. and I.B. Weinstein (1998) "c-K-*ras* overexpression in rat enterocytes causes resistance to sulindac sulfide induced apoptosis". *Gastroenterology,* 113: 1892 - 1900.

16. Han, E.K., Arber, N., Yamamoto, H., Lim, J., Delohery, T., Pamukcu, R., **Piazza, G.A.,** Xing, W. and I. B. Weinstein (1998) "Effects of sulindac and its metabolites on growth and apoptosis in human mammary epithelial and breast carcinoma cell lines". *Breast Cancer Research and Treatment* 48: 195 - 203.

17. Malkinson, A.M., Koshi, K.M., Dwyer-Nield, L.D., Rice, P.L., Rioux, N., Castonguay, A., Ahnen, D.J., Thompson, H., Pamukcu, R. and **G.A. Piazza** (1998) "Inhibition of NNK-induced mouse lung tumor formation by FGN-1 (sulindac sulfone)". *Carcinogenesis* 19:1353 - 1356**.**

18. Skopinska-Roszewska, E., **Piazza, G.A.,** Sommer, E., Pamukcu, R., Barcz, E., Filewska, M., Kupis, W., Caban, R., Rudzinski, P., Bogdan, J., Mlekodaj S. and E. Sikorska (1998) "Inhibition of angiogenesis by sulindac and its sulfone metabolite (FGN-1): a potential mechanism for their antineoplastic properties*". Tissue Reactions: Experimental and Clinical Aspects* 20: 85 - 91**.**

19. Goluboff, E.T., Shabsigh, A., Saidi, J.A., Weinstein, I.B., Mitra, N., Heitjan, D., **Piazza, G.A.,** Pamukcu, R., Buttyan, R. and C.A. Olsson (1999) "FGN-1 (sulindac sulfone) suppresses growth of human prostate cancer in a nude mouse xenograft model by increasing apoptosis". *Urology* 53: 440 - 445.

20. Lim., J.T., **Piazza, G.A.,** Han, E.K., Delohery, T. M., Li, H., Finn, T.S., Buttyan, R., Yamamoto, H., Sperl, G.J., Brendel, K., Gross, P.H., Pamukcu, R. and I.B. Weinstein (1999) "Sulindac derivatives inhibit growth and induce apoptosis in human prostate cancer cell lines". *Biochemical Pharmacology* 58: 1097 - 1107.

21. Stoner, G.D., Budd, G.T., Ganapathi, R., DeYoung, B., Kresty, L.A., Church, J.M., Provencher, K., Pamukcu, R., **Piazza, G**., Hawk, E., Kelloff, G., Elson, P. and R. U. van Stolk (1999) "Sulindac sulfone induced regression of rectal polyps in patients with familial adenomatous polyposis". *Adv. Exp. Med. Biol.* 470: 45-53.

22. Thompson, W. J., **Piazza, G.A**., Li, H., Liu, L., Fetter, J., Zhu, B., Sperl, G., Ahnen, D., and R. Pamukcu (2000) "Exisulind induced apoptosis involves cGMP PDE Inhibition, PKG activation, and attenuated β-catenin". *Cancer Research*, 60: 3338 – 3342.

23. Soh, J., Mao, Y., Kim, M., Pamukcu, R., Li, H., **Piazza, G.A.,** Thompson, W. J., and I. B. Weinstein (2000) "Cyclic GMP mediates apoptosis induced by sulindac derivatives via activation of c-jun NH2-Terminal Kinase 1". *Clinical Cancer Research* 6: 4136-4141.

24. Lawson, K. R., Ignatenko, N. A., **Piazza, G.A.,** Cui, H., and E. W. Gerner (2000) "Influence of K-ras activation on the survival responses of Caco-2 cells to the chemopreventive agents sulindac and difluoromethylornithine". *Cancer Epidemiol Biomarkers Prev* 9: 1155-62.

25. **Piazza, G.A.,** Thompson, W. J., Pamukcu, R., Whitehead, C., Li, H., Fetter, J., Gresh, B., Klein-Szanto, A., Farnell, D., Eto, I., and C. J., Grubbs (2001) ") "Exisulind, a novel proapoptotic drug, inhibits rat urinary bladder tumorigenesis". *Cancer Research* 61: 3961-3968.

26. Chan, D. C., Earle, K., A., Zhao, T. L., Helfrich, B., Zeng, C., Baron, A., Whitehead, C. M., **Piazza, G.,** Pamukcu, R., Thompson, W., J., Alila, H., Nelson, P. and P. A. Bunn (2002) "Exisulind in combination with docetaxel inhibits growth and metastasis of human lung cancer and prolongs survival in athymic nude rats with orthotopic lung tumors". *Clinical Cancer Research* 8: 904-912.

27. Bunn, P. A., Chan, D. C., Earle, K., A., Zhao, T. L., Helfrich, B., Kelly, K., **Piazza, G.,** Whitehead, C. M., Pamukcu, R., Thompson, W., J., and Alila, H. (2002) "Preclinical and clinical studies of docetaxel and exisulind in the treatment of human lung cancer". *Seminars in Oncology* 29: 87-94.

28. Whitehead, C. M., Earle, K., A., Fetter, J., Xu, S., Hartman, T., Chan, D. C., Zhao, T. L., **Piazza, G.,** Klein-Szanto, A. J., Pamukcu, R., Alila, H., P. A. Bunn, and W. J. Thompson (2003). "Exisulind-induced apoptosis in a non-small cell lung cancer orthotopic model augments docetaxel treatment and contributes to increased survival". *Molecular Cancer Therapeutics* 2: 479-488.

29. Joe, A. K., Liu, H., Xioa, D., Soh, J., Pinto, J. T, Beer, D. G., **Piazza, G.A.,** Thompson, W.J., and I. B. Weinstein (2003). Exisulind and CP248 induce growth inhibition and apoptosis in human esophageal adenocarcinoma and squamous cell carcinoma cells". *Journal of Experimental Therapeutics and Oncology* 3: 83-94.

30. Rice, P.L., Kelloff, J., Sullivan, H.; Driggers, L.J., Beard, K.S., Kuwanda, S., **Piazza, G.,** and D. J. Ahnen (2003). Sulindac metabolites induce caspase- and proteasome-dependent degradation of β-catenin protein in human colon cancer cells". *Molecular Cancer Therapeutics* 2: 885-892.

31. Lim, J.T., **Piazza, G.A.,** Pamukcu, R., Thompson, W.J., and I.B. Weinstein (2003). "Exisulind and related compounds inhibit expression and function of the androgen receptor in human prostate cancer cells". *Clinical Cancer Research* 9: 4972-4982.

32. Basler, J. W. and **Piazza, G.A.** (2004). "NSAIDs and cyclooxygenase-2 inhibitors for prostate cancer chemoprevention". *J. Urol.* 171(2): S59-S63.

33. Thompson, I. M., **Piazza, G.A.** et al, (2004). "First International Conference on Chemoprevention of Prostate Cancer". *J. Urol.* 171(2): S3-S4.

34. Kim, K.P., Whitehead, C. **Piazza, G.** and Wargovich, M.J. (2004) "Combinatorial chemoprevention: efficacy of lovastatin and exisulind on the formation and progression of aberrant crypt foci". *Anticancer Res.* 24: 1805-1812.

35. **Piazza, G.A.** (2005) "Utilizing a new tool for drug discovery: Building a better toolbox for research by increasing the availability of molecular probes". *Genetic Engineering News,* 25: 44-46.

36. White, E.L., Maddry, J.A., Ananthan, S., and **G.A. Piazza** (2008) "Southern Research Molecular Libraries Screening Center". *Screening,* 3: 1-4.

37. Jia, L., Noker P.E., **Piazza G.A.,** Leuschner, C., Hansel, W., Gorman, G.S., Coward, L.U., and Tomaszewski, J. (2008) "Pharmacokinetics and pharmacodynamics of Phor21-βCG(ala), a lytic peptide conjugate". *J. of Pharmacy and Pharmacology*, 60:1441-1448.

38. Lu, W., Tinsley H., Keeton, A., **Piazza, G.A.** and Li, Y. (2009) "Suppression of Wnt/β-Catenin signaling inhibits prostate cancer cell proliferation". *European Journal of Pharmacology* 602: 8-14.

39. **Piazza, G.A.,** Keeton, A.B., Tinsley, H.N., Gary, BD, Whitt, J.D., Mathew, B., Thaiparambil, J., Coward, L., Gorman, G., Li, Y., Sani, B., Hobrath, J.V., Maxuitenko, Y.Y. and Reynolds, R.C. (2009) "A Novel Sulindac Derivative That Does Not Inhibit Cyclooxygenases, but Inhibits Colon Tumor Cell Growth and Induces Apoptosis with Antitumor Activity". *Cancer Prevention Research* 2: 572-580.

40. Abadi, A.H., Ibrahim, T.M., Lehmann, J., Tinsley, H.N., Gary, B.D., and **Piazza, G.A.** (2009) "Design, Synthesis and Biological Evaluation of Novel Pyridine Derivatives as Anticancer Agents and Phosphodiesterase 3 Inhibitors". *Bioorganic Medicinal Chemistry* 17:5974-5982.

41. Abadi, A. H., Abouel-Ella, D. A., Ahmed, N. S., Gary, B. D., Thaiparambil, J. T., Tinsley, H. N., Keeton, A. B., and **Piazza, G.A.** (2009) "Synthesis of Novel Tadalafil Analogues and their Evaluation as Phosphodiesterase Inhibitors and Anticancer Agents". *Arzneimittel forschung/Drug research Arz. Forschung* 59: 415-421.

42. Tinsley, H.N., Gary, B.D., Keeton, A.B., Zhang, W., Abadi, A.H., Reynolds, R.C., and **Piazza, G.A.** (2009) "Sulindac Sulfide Selectively Inhibits Growth and Induces Apoptosis of Human Breast Tumor Cells by PDE5 Inhibition, Elevation of cGMP, and Activation of PKG". *Molecular Cancer Therapeutics* 8: 3331-3340.

43. Abadi, A.H., Abouel-Ella, D.A., Lehmann, J., Tinsley, H.N., Gary, B.D., **Piazza, G.A.,** and M. Abdel-Fatta (2010) "Discovery of Novel Colon Tumor Cell Growth Inhibitory Agents through a Combinatorial Approach". *European Journal of Medicinal Chemistry* 45: 90-97.

44. Abadi, A.H., Gary, B.D., Tinsley, H.N., **Piazza, G.A**, and M. Abdel-Halim (2010) "Synthesis, molecular modeling, and biological evaluation of novel tadalafil analogues as phosphodiesterase 5 and colon tumor cell growth inhibitors, new stereochemical perspective". *European Journal of Medicinal Chemistry* 45: 1278-1286.

45. **Piazza, G.A**., Keeton, A.B., Tinsley, H.N, Whitt, J., Gary, B., Matthew, B., Singh, R., Grizzle, W., and Reynolds, R. (2010) "NSAIDs: Old drugs reveal novel anticancer drug targets". *Pharmaceuticals* 3: 1652-1667.

46. Zhang, L., Nebane, M., Wennerberg, K., Li, Y., Neubauer, V., McKellip, S., Rasmussen, L., Shindo, N., Sosa, M., Maddry, J. Ananthan, S., **Piazza, G.A.,** White, E.L., and E. Harsay

(2010) "A high-throughput screen for chemical inhibitors of exocytic transport in yeast". *Chem Bio Chem* 11: 1291-1301.

47. Zhang, Y, Zhang, J., Wang, L., Quealy, E., Gary, B.D. Reynolds, R.C., **Piazza, G.A.,** and J. Lu, (2010) "A novel sulindac derivative lacking COX-inhibitory activities antagonizes AR signaling, inhibits proliferation and suppresses prostate carcinogenesis". *Cancer Prevention Research* 3: 885-895.

48. Tinsley, H.N., Gary, B.D., Thaiparambil, J., Li, N., Lu, W., Li, Y., Maxuitenko, Y.Y. Keeton, A.B., and **Piazza, G.A.** (2010) "Colon tumor cell growth inhibitory activity of sulindac sulfide and other NSAIDs is associated with PDE5 inhibition". *Cancer Prevention Research* 3: 1303-1313.

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159. Adam B. Keeton, Ph.D., Antonio Ward, Xi Chen, Jacob Valiyaveettil, Bing Zhu, Veronica Ramirez-Alcantara, Yulia Maxuitenko, Kristy Berry, Tyler E. Mattox, Michael R. Boyd and **Gary A. Piazza** "A Novel RAS Inhibitor, MCI-062, Inhibits Colon Tumor Growth *In Vivo* and Activates Antitumor Immunity". AACR 2019.

160. Mattox TE, Chen X, Valiyaveettil J, Maxuitenko Y, Zhu B, Ward AB, Ramirez-Alcantara V, Berry K, Boyd, MR, Keeton AB, and **Piazza GA**. Novel RAS inhibitor, MCI-062, potently and selectively inhibits the growth of *KRAS* mutant pancreatic tumor cells by blocking GTP loading of RAS". AACR 2019.

161. Antonio Ward, Xi Chen, Jacob Valiyaveettil, Kevin Lee, Yulia Maxuitenko, Veronica Ramirez-Alcantara, Kristy Berry, Luciana Madeira da Silva, Bing Zhu, Tyler Mattox, Michael R. Boyd, Adam Keeton, and **Gary A. Piazza** "A novel PDE10/β-catenin inhibitor, MCI-030, for the treatment of colorectal cancer". AACR 2019.

162. Bing Zhu, Veronica Ramirez-Alcantara, Antonio Ward, Kristy Berry, Adam B. Keeton, Michael R. Boyd, Yulia Maxuitenko, Xi Chen, **Gary A. Piazza** "A novel PDE10/β-catenin inhibitor, MCI-048, suppresses lung tumorigenesis to block metastasis". AACR 2019.

163. Mattox TE, Norton TS, Keeton AB, Maxuitenko YY, Berry KL, Zhu B, Musiyenko A, Gavin E, Ramirez-Alcantara V, Chen X, Valiyaveettil J, Scalici J, Rocconi RP, **Piazza GA**, Madeira da Silva LM "Targeting RAS and downstream signaling in high-grade serous ovarian carcinoma with novel RAS effector binding inhibitors". AACR 2019.

164. **Piazza, G.A.** "Novel PDE10 inhibitors with anticancer activity that suppress Wnt-induced beta-catenin transcription by activating cGMP/PKG signaling" *Journal Translational Medicine.* Vol 17. Presented as an oral presentation at the 2019 cGMP Signaling Conference, Mainz, Germany.

165. **Piazza, G.A.,** Sigler, S.C., Maxuitenko, Y., Ward, A., Alawa, M., Abdel-Halim, M, and A.H. Abadi, "Abazafil: a first-in-class, highly potent and selective, allosteric inhibitor of phosphodiesterase 5 with penile erection and cognition enhancing properties", *Journal Translational Medicine* Vol 17. Presented as a poster at the 2019 cGMP Signaling Conference, Mainz, Germany.

166. L Madeira da Silva, **Gary A Piazza**, Jennifer M Scalici "A novel NSAID derivative, MCI-030 in the chemoprevention of ovarian cancer in hens", Gynecologic Oncology, 159, 156, 2020.

167. Rebecca M Barber, Elaine Gavin, Alla Musiyenko, Wito Richter, Kevin J Lee, Annelise Wilhite, Joel F Andrews, Steve McClellan, Ileana Aragon, Antonio Ward, Xi Chen, Adam Keeton, Kristy Berry, **Gary A Piazza**, Jennifer M Scalici, Luciana Madeira da Silva, "PDE10A as a novel target to suppress Wnt/β-catenin signaling and other oncogenic pathways in ovarian cancer". Cancer Research 81 (13 Supplement), 1213. 2021.

168. Rebecca M Borneman, Luciana Madeira da Silva, Elaine Gavin, Joel F Andrews, Wallace Berry, Xi Chen, **Gary A Piazza**, Jennifer M Scalici, The novel NSAID-derivative, MCI-030, prevents ovarian cancer in the egg-laying hen by increasing tumor cell apoptosis and decreasing oncogenic signaling pathways". Eur. J. Gyn. Oncology, 42 (2), 383-384, 2021.

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PATENTS

1. **Piazza, G. A.**, and A. Mazur (Filed 1991) "Treatment of skin wrinkles in mammalian skin by topical application of a lysophosphatidic acid compound or its cyclic derivative or pharmaceutically acceptable salt". Granted 1993.

2. **Piazza, G. A.**, J. Kasting, and A. Mazur (Filed 1992) "Use of deoxy- and halo-analogs of lysophosphatidic acid for repair of photodamaged skin". Granted 1994.

3. **Piazza, G. A.**, and A. Mazur (Filed 1993) "Methods of using lysophosphatidic acid derivatives for treating hyperproliferative conditions".

4. Pamukcu, R. and **G. A. Piazza** "Methods for inhibiting neoplastic cells and related conditions by exposure to substituted N-arylmethyl and heterocyclicmethyl-1H-pyrazoloquinoline amines" 5,852,035; Granted Dec. 22, 1998.

5. **Piazza, G. A.**, Pamukcu, R. and W. J. Thompson "Methods for identifying compounds for inhibition of cancerous lesions". 5,858,694; Granted Jan. 12, 1999.

5. Pamukcu, R. and **G. A. Piazza** "Method of treating a patient having precancerous lesions with phenyl pyrimidinone derivatives". Granted Feb. 23, 1999.

6. **Piazza, G. A.**, Skopinska, E., and R. Pamukcu. "Methods for treating patients with psoriasis by administering substituted sulfonyl indenyl acetic acids, esters and alcohols". 5,902,827, Granted May 11, 1999.

7. Pamukcu, R. and **G. A. Piazza** "Methods for inhibiting neoplastic cells by exposure to substituted N-cycloalkylmethyl-1-H-pyrazolo (3,4, -B) quinolone-4 amines". 5,942,520; Granted Aug. 24, 1999.

8. Sperl, G., **Piazza, G. A.**, Pamukcu, R., Gross, P. and K. Brendel "Substituted condensation products of n-benzyl-3-indenyl acetamides with heterocyclic aldehydes". 5,948,779; Granted Sept. 7, 1999.

9. Sperl, G., **Piazza, G. A.**, Pamukcu, R., Gross, P. and K. Brendel "Methods for inhibiting neoplastic cells and related conditions by exposure to thienopyrimidine derivative". 5,948,911; Granted Sept. 7, 1999.

10. **Piazza, G. A.**, Pamukcu, R., and E. Skopinska "Methods for treating patients with sarcoidosis by administering substituted sulfonyl indenyl acetic acids, esters and alcohols". 5,958,982; Granted Sept. 28, 1999.

11. Sperl, G., **Piazza, G. A.**, Pamukcu, R., Gross, P. and K. Brendel "Methods for treating patients having precancerous lesions with substituted indene derivatives". 5,965,619; Granted Oct. 12, 1999.

12. **Piazza, G. A.** and R. Pamukcu. "Methods for inhibiting neoplastic cells and related conditions by exposure to quinazoline derivatives". 5,990,117; Granted Nov. 23, 1999.

13. Sperl, G., Gross, P., Brendel, K., **Piazza, G.** and R. Pamukcu. "Substituted methoxy benzylidene indeyl-acetic and propionic acids for treating patients with precancerous lesions". 5,998,477; Granted Dec. 7, 1999.

14. Sperl, G., Gross, P., Brendel, K., **Piazza, G. A.**, and R. Pamukcu "Substituted condensation products of 1H-indenyl-hydroxyalkanes with aldehydes for neoplasia". 6,028,116; Granted Feb. 22, 2000.

15. Pamukcu, R and **G. A. Piazza**. "Method for inhibiting neoplastic lesions by administering 4-(arylmethylene)-2,3-dihydro-pyrazol-3-ones". 6,034,099; Granted March 7, 2000.

16. Pamukcu R. and **G. A. Piazza**. "Method for inhibiting neoplastic cells and related conditions by exposure to quinazolinedione and pyridopyrimidinedione derivatives". 6,037,345; Granted March 14, 2000.

17. Pamukcu R. and **G. A. Piazza**. "Method of inhibiting neoplastic cells with tetracyclic pyrido[3,4-B] indole derivatives". 6,046,199; Granted April 4, 2000.

18. Pamukcu, R. and **G. A. Piazza.** "Method of treating a patient having precancerous lesions with amide quinazoline derivatives", 6,046,206; Granted April 4, 2000.

19. **Piazza, G. A**. and R. Pamukcu. "Method of treating a patient having precancerous lesions with phenyl pyridinone derivatives". 6,046,216; Granted April 4, 2000.

20. Sperl, G., Gross, P., Brendel, K., **Piazza, G.** and R. Pamukcu. "Substituted benzylidene indenyl formamides, acetamides and propionamides". 6,063,818; Granted May 16, 2000.

21. Sperl, G. J., Gross, P., Brendel, P., **Piazza, G. A.** and R. Pamukcu. "Substituted condensation products of N-benzyl-3-indenylacetamides heterocyclic aldehydes for neoplasia". 6,066.634; Granted May 23, 2000.

22. Sperl, G. J., Gross, P., Brendel, P., **Piazza, G. A.** and R. Pamukcu. "Method of inhibiting neoplastic cells with pyrazopyridazinone derivatives". 6,077,842; Granted June 20, 2000.

23. Sperl, G. J., Gross, P., Brendel, P., **Piazza, G. A.** and R. Pamukcu. "Substituted methoxy benzylidene indenyl acetic and propionic acids for treating patients with precancerous lesions". 6,121,321; Granted Sept. 19, 2000.

24. Pamukcu, R. and **Piazza, G. A**. "Method of inhibiting neoplastic cells with pyrazopyridazinone derivatives". 6,124,303; Granted Sept. 26, 2000.

25. Pamukcu, R. and **Piazza, G. A.** "Method for inhibiting neoplastic cells and related conditions by exposure to thienopyrimidine derivatives". 6,133,271; Granted Oct. 22, 2000.

26. **Piazza, G. A.** and R. Pamukcu. Methods for using a phosphodiesterase in pharmaceutical screening to identify compounds for treatment of neoplasia". 6,156,528; Granted Dec. 5, 2000.

27. Sperl, G. J., Gross, P., Brendel, P., **Piazza, G. A.** and R. Pamukcu. "Substituted condensation products of N-benzyl-3-indenylaceamides with heterocyclic aldehydes for neoplasia". 6,166,053; Granted Dec. 26, 2000.

28. Wang, X., Sperl, G., Gross, P., Pamukcu, R., and **G. A. Piazza.** "Fused disubstituted diazine derivatives with nitrogen containing substitutents in position one for the treatment of neoplasia". 6,180,629; Granted Jan. 30, 2001.

29. **Piazza, G. A.** and R. Pamukcu. "Method of treating a patient having precancerous lesions with phenyl purinone derivatives". 6,200,980; Granted March 13, 2001.

30. Lu, L., R. Pamukcu, W.J. Thompson, **G. A. Piazza**, H. Li, and B. Zhu. "Method of using a novel phosphodiesterase in pharmaceutical screening to identify compounds for treatment of neoplasia". 6,200,771; Granted March 13, 2001.

31. Pamukcu, R. and **G. A. Piazza.** "Method for treating neoplasia with amino or pyridylamino cyclobutene derivatives", 6,211,220; Granted April 3, 2001.

32. Sperl, G. J., **Piazza, G. A**. and R. Pamukcu. "Method of inhibiting neoplastic cells with indole derivatives". 6,358,992; Granted March 19, 2002.

33. Pamukcu, R. and **G. A. Piazza.** "Method for treating neoplasia by exposure to substituted benzimidazole derivatives", 6,369,092; Granted April 9, 2002.

34. Pamukcu, R. and **G. A. Piazza**. "Method for inhibiting neoplastic cells with 4,5-diaminopyrimidine", 6,380,206; Granted April 30, 2002.

35. Pamukcu, R. and **G. A. Piazza.** "Method for inhibiting neoplastic cells with indole derivatives", 6,410,584; Granted June 5, 2002.

36. Pamukcu, R. and **G. A. Piazza**. "Method for treating neoplasia by exposure to N, N'-substituted benzimidazol-2-ones", 6,420,410; Granted July 16, 2002.

37. Pamukcu, R. and **G. A. Piazza**. "Substituted condensation products of N-benzyl-3-indenylacetamides with heterocyclic aldehydes for neoplasia", 6,426,349; Granted July 30, 2002.

38. Pamukcu, R. and **G. A. Piazza**. "Methods for treating neoplasia by exposure to benzothienopyrimidine derivatives", 6,432,650; Granted August 13, 2002.

39. Pamukcu, R. and **G. A. Piazza**. "Method for inhibiting neoplastic cells with isoquinoline derivatives", 6,486,155; Granted November 26, 2002.

40. Pamukcu, R. and **G. A. Piazza**. "Method for identifying compounds for inhibiting of neoplastic lesions, and pharmaceutical compositions containing such compounds", 6,500,610; Granted December 31, 2002.

41. **Piazza, G. A.** et al., "Diagnostic methods for neoplasia", 6,875,575; Granted April 5, 2005.

42. **Piazza, G.A.** and R.C. Reynolds, "Novel sulindac derivatives for the treatment of neoplasia"; US Patent Application: 7,649,373; Filed 2007.

43. **Piazza, G.A.**, Keeton, A.B., Whitt, J.D. and J.A. Maddry, "5-Quinolinone and imidazopyrimidine compounds and use thereof for reversal of multidrug resistance"; US Patent Application; Filed 2008.

44. **Piazza, G.A**. and A.H. Abadi, "Novel alkyl halide derivatives of tadalafil with anticancer properties". WPO063223, filed 2009.

45. **Piazza, G.A.** and R.C. Reynolds, "Derivatives of sulindac, use thereof, and preparation thereof". US Patent 8044018, filed 2011.

46. **Piazza, G.A.** and A. H. Abadi, "Derivatives of celecoxib and their use thereof". WPO 125884, filed 2012.

47. Tarek H. and **Piazza, G.A.** "Amide amino acid derivatives of NSAIDs as potent inhibitors of colon tumor cell growth", filed 2011.

48. **Piazza, G.A**. "Treatment and diagnosis of cancer and precancerous conditions using PDE10 inhibitors and methods to measure PDE10 expression". U.S. Patent Application No. 61/845,787.

49. **Piazza, G.A.,** Chen, X., Keeton, A.B. and M.R. Boyd. "Indenyl compounds, pharmaceutical compositions, and medical uses thereof", U.S. Patent Application No. 14/571617.

50. **Piazza, G.A.,** Chen, X., Keeton, A.B. and M.R. Boyd. "Methods of treating or preventing Ras-mediated diseases", U.S. Patent Application No. 14/571,690.

51. **Piazza, G.A.,** Chen, X., Keeton, A.B. and M.R. Boyd "Ras-inhibiting indenyl acetamide compounds, compositions, and uses", PCT/U.S. Patent Application No. 14/70511.

52. **Piazza, G.A.,** Chen, X., Keeton, A.B and M. R. Boyd. "Compounds, compositions, and methods of treating Ras-mediated diseases", U.S. Patent Application No. 62/092,491.

53. **Piazza, G.A.,** Chen, X., Keeton, A.B. and M.R. Boyd. "Ras inhibitory indole compound, composition, and method of treatment", U.S. Patent Application No. 62/092,498.

54. **Piazza, G.A.** Chen, X., and Weissbach, H. "Novel derivatives of sulindac can protect normal cells against oxidative damage" U.S. Patent Application No. 16/495,013.

PRESENTATIONS

1. IBC International Conference on Tumor Suppressors and Oncogenes. Talk entitled, "How do NSAIDs Prevent Cancer?" San Francisco CA, July 1997.

2. International Congress of Oncology, Talk entitled, "Biochemical and cellular mechanisms for the cancer chemopreventive properties of NSAIDs". Athens Greece, October 1997.

3. IBC International Conference on Apoptosis. Talk entitled: "Mechanism for the chemopreventive properties of NSAIDs". San Diego CA, October 1997.

4. Strategic Research Institute Conference, "Emerging Concepts in Cancer Therapy". Talk entitled: "Induction of apoptosis by FGN-1, a drug in development for the treatment of precancerous lesions." Princeton NJ, February 1998.

5. "Biochemical and Cellular Mechanisms for the Antineoplastic Properties of Nonsteroidal Anti-inflammatory Drugs" University of Colorado, February 1998.

6. "Biochemical and Cellular Mechanisms for the Antineoplastic Properties of Nonsteroidal Anti-inflammatory Drugs" Columbia University, New York NY, March 1998.

7. Prostate Cancer: Advances in Understanding, Diagnostics and Therapy. Talk entitled: "Antineoplastic properties of the apoptosis-inducing drug, FGN-1." Washington DC, March 1998.

8. "Biochemical and Cellular Mechanisms for the Antineoplastic Properties of Nonsteroidal Anti-inflammatory Drugs" Fox Chase Cancer Center, Philadelphia PA, April 1998.

9. Molecular Basis for the Prevention of Colon, Breast and other Cancers by Aspirin and other NSAIDs. Talk entitled: "Is inhibition of tumor development by NSAIDs related to cyclooxygenase inhibition?" NIHES, Research Triangle Park NC, May 1998.

10. IBC International Conference on Apoptosis, talk entitled, "Apoptosis-inducing properties of exisulind, a drug in Phase III trials for cancer indications". San Francisco CA, December 1998.

11. Gastroenterology Department Grand Rounds, Medical College of Pennsylvania, "Mechanisms for the antineoplastic properties of NSAIDs", Philadelphia PA, January 1999.

12. American Gastroenterology Association Conference Symposium entitled "Novel targets for colon cancer chemoprevention, Orlando FL, May 1999.

13. CTRC Institute for Drug Development, Drug Development Lecture, "Cyclooxygenase independent- mechanisms for the antineoplastic properties of NSAIDs", November 2001.

14. University of Texas Health Sciences Center San Antonio, Department of Pharmacology, "Cyclooxygenase independent mechanisms for the antineoplastic properties of NSAIDs", February 2002.

15. Anticancer Drug Discovery Summit, "Cancer chemopreventive properties of NSAIDs and COX-2 inhibitors, June 2003. (Chaired conference).

16. Assays and Cellular Targets Conference, "A phenotypic HTS assay for identifying compounds that reverse drug resistance", San Diego, October 2007 (Chaired session).

17. Assay Development and Screening Technologies Conference, "HTS to identify MRP1 inhibitors for reversal of multidrug resistance", San Francisco, June 2008 (Chaired session).

18. NCI ABC Conference. "High throughput screening to identify MRP1 inhibitors for reversal of multidrug resistance", Frederick, MD, October 2008.

19. 4th Annual Modern Drug Discovery and Development Conference, "A novel sulindac derivative with strong anticancer activity", San Diego, October 2008.

20. Gordon Research Conference on Cyclic Nucleotides and Phosphodiesterases (2010, 2012, 2014, 2018) - invited for a full talk.

21. 1st Annual Cancer Pharmacology Research Conference, "A novel Wnt/β-catenin inhibitor for colorectal cancer". (Plenary speaker), New York, NY, 2017.

22. Cyclic GMP Conference, "Role of cGMP in regulating tumor cell growth". (Keynote speaker), Mainz, Germany, June 2019.

23. International Biomedicine Summit, "Novel anticancer drug development candidates targeting PDE10 to selectively block Wnt and RAS signaling" (Plenary speaker), Nanning, China, August 2019.

24. 2nd Annual Cancer Pharmacology Research Conference, "Novel anticancer drug development candidates targeting PDE10 to selectively block Wnt and RAS signaling". (Plenary speaker), Weifang, China, 2019.

25. "Novel RAS inhibitor", Discovery on Target, Small G Protein session, September 2020.

26. "Novel RAS inhibitor", RAS Targeted Drug Development Summit, Co-chaired workshop entitled: "Expanding novel approaches toward RAS drug discovery with degradation strategies". September 2020.

27. "Novel PDE10 inhibitor activates cGMP/PKG signaling to selectively suppress oncogenic Wnt/β-catenin transcriptional activity". Chaired day one of conference entitled: "Wnt & β-catenin targeted drug discovery, November 2021.

28. *Non-conference scientific presentations:* Roche Pharmaceuticals (2005), Purdue University (2006), Fox Chase Cancer Center (2007), Johns Hopkins (2007), Hormel Institute (2008),

Mayo Clinic (2008), SUNY at Stony Brook (2008), St. John's University (2008), University of Tennessee (2009), USA Mitchell Cancer Center (2009), University of Alabama at Birmingham (2004, 2006, 2008, 2010, 2014), Samford University (2010), Cancer Research Center of Hawaii (2010), University of Kansas Cancer Center (2010, 2014), University of South Alabama (2010), University of South Carolina (2012), Georgia Regents University (2013), Tuskegee University (2013), University of Kentucky (2014), Texas Tech Health Sciences Center (2015), University of North Carolina (2015), Wake Forest University (2015), Beijing Technology and Business University, Beijing China (2015), Zhejiang University (2015), Changzhou University, Changzhou Chia (2015), Jinan University, Hangzhou China (2015), Sun Yat-Sen University, Guangzhou China (2015), University of Minnesota (2016), Hormel Research Institute (2016), MD Anderson (2016), UTMB Galveston (2017), MD Anderson (2017), University of Augusta (2017), LSU Cancer Center (2017), UAB Cancer Center(2018), City University of Hong Kong (2018), Fox Chase Cancer Center (2019), Max Planck Institute, Germany (2019), Tianjin Medical University, China (2019), Auburn University (2020), University of South Alabama (2020), St John's University (2021).

FUNDING RECORD

ACTIVE

1R01CA254197-01 Piazza (PI) 11/01/21-10/31/26 2.4 calendar
NIH/NCI $282,223
Title: Novel inhibitor for oncogenic RAS for lung cancer
Role: Principal Investigator
Description: The long-term goals are to better understand mechanism of action, identify a drug development candidate for IND-enabling safety assessment and establish a mechanistic rationale to select patients for clinical trials based on activated RAS levels.
Scored in 2nd percentile

5 R01 CA197147-04 Piazza (PI) 07/15/16-06/30/21 (NCE) 2.4 calendar
NIH/NCI $228,750
Title: Phosphodiesterase 10A, a novel target for lung cancer chemoprevention
Role: Principal Investigator (PI)
Description: This project will synthesize and design a novel group of sulindac derivatives relating to a drug development candidate, MCI-048, that contain a methyl-pyrrolidene substitution for lung cancer by targeting phosphodiesterase 10 and to evaluate their efficacy, safety, and mechanism of action using *in vitro* and *in vivo* models. Additional aims are to study the involvement of PDE10 in lung tumorigenesis and to study additional analogs.

Grant number: Piazza (MPI) 03/01/20-02/28/25 1.2 calendar
NIH/NCI: 1 R01CA238514-01 $200,000
Title: Novel sulindac derivatives targeting cGMP signaling to enhance cancer immunotherapy
Role: Principal Investigator (MPI with Dr. Gang Zhou, Augusta University)
Description: This proposal will synthesize and characterize a novel series of non-COX inhibitory sulindac derivatives using prototype derivatives that target PDE5 and/or PDE10, while optimizing drug-like properties to increase systemic exposure.

A18-0041 (Piazza) 01/01/20-12/31/21 (NCE) 0.12 calendar
BCRFA $20,000
Role: Principal Investigator

Title: Evaluation of a novel sulindac derivative for breast cancer chemoprevention in a rat model of chemical-induce mammary tumorigenesis.
Description: The purpose of this project is to evaluate a novel sulindac derivative, MCI-715, for breast cancer in a mouse model of metastatic disease.

To be assigned (Piazza) 01/01/21-12/31/22 0.12 calendar
BCRFA $25,000
Role: Principal Investigator
Title: A NOVEL β-CATENIN BLOCKER THAT ACTIVATES ANTITUMOR IMMUNITY FOR BREAST CANCER
Description: The purpose of this project is to evaluate a novel sulindac derivative, ADT-030, for breast cancer in a mouse model of metastatic disease.

HHSN28120032 (Clapper) 07/25/18-07/24/21 (NCE) 0.96 calendar
NIH *via* Fox Chase Cancer Center $40,986
Title: A Novel Non-COX inhibitory Sulindac Derivative for Colorectal Cancer Chemoprevention with Selective PDE10 and Wnt/β-Catenin Inhibitory Activity
Role: Sub-contract PI
Description: Use a panel of biomarkers to assess chemopreventive activity of a novel sulindac derivative, MCI-030.

<u>PENDING</u>

1 R01 CA260894-01 Piazza (PI) 01/01/21-06/30/26 2.4 calendar
NIH/NCI $359,930
Title: A novel reversible pan-RAS inhibitor for colorectal cancer
Role: Principal Investigator
Description: The long-term goals of this project are to: 1) identify an orally bioavailable RAS inhibitor prodrug for IND-enabling GLP toxicity testing, 2) use clinically relevant colon tumor organoid models to confirm antitumor activity of RAS inhibitor and activated RAS levels as a useful biomarker or companion diagnostic, and 3) explore potential benefits of combining RAS inhibitor with immunotherapy.
Submitted 10/21 – to be resubmitted

Joint US Egypt Grant (Piazza) 6/1/19 – 5/31/21 0.36 calendar
National Academy of Sciences $200,000
Targeted Nano-delivery System(s) of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)-Amino Acids Conjugates with Potential Colorectal Cancer (CRC) Chemoprevention
Role: Principal Investigator
Description: The application seeks to develop safer and more effective NSAIDs derivatives for colorectal cancer chemoprevention by designing out cyclooxygenase inhibitory activity and a nanoparticle formulation as a strategy to provide colon-target delivery.
Awaiting peer review

SPORE grant (R01 equivalent) in preparation

COMPLETED

Grant number: 5 R01 CA131378-10 (Piazza) 06/1/15-12/31/20 1.8 calendar
NIH/NCI $268,800
Title: Novel sulindac derivatives for colon cancer chemoprevention
Role: Principal Investigator (PI)
Description: This project will synthesize and design novel sulindac derivatives relating to a drug development candidate, MCI-030, that contain a pyridine substitution for colorectal cancer by targeting phosphodiesterase 10 and to evaluate efficacy, safety, and mechanism of action using *in vitro* and *in vivo* models. Additional aims are to study the involvement of PDE10 in colon tumorigenesis and to study additional analogs.

Grant number: 5 R01 CA155638-06 (Piazza) 8/16/12-05/31/19 2.4 calendar
NIH/NCI $285,420
Title: PDE5, a novel target and inhibitor for breast cancer chemoprevention
Role: Principal Investigator (PI)
Description: The goal is to study the involvement of the cGMP specific phosphodiesterase isozyme, PDE5 as a target for breast cancer chemoprevention and to develop novel PDE5 inhibitors.

W81XWH-17-1-0229 (Scalici) 09/15/17-09/14/19 0.24 calendar
DOD $250,000
Title: Novel NSAID Derivatives for the Chemoprevention of Ovarian Cancer in the Spontaneous Hen Model
Role: Collaborator
Title: The purpose of this project is to evaluate a novel PDE10 inhibitor, MCI-030, for ovarian cancer in an animal model.

Grant number: R43CA206807 (Piazza, subaward) 9/1/2016 – 8/31/2018 0 calendar
Agency: NIH/NCI $15,000
Title: Novel RAS inhibitor prodrug for colorectal cancer
Role: Principal Investigator (MPI)
Description: A series of novel RAS inhibitor prodrugs will be synthesized and evaluated for oral bioavailability and anti-tumor efficacy by pharmacokinetic studies and a mouse colon tumor model.

1 R01CA148817-05 (Piazza) 8/01/10-7/31/16 3.6 calendar
NIH/NCI $1,672,588
Title: Development of a novel sulindac sulfide amide for colorectal cancer chemoprevention
Role: Principal Investigator (PI)
Description: The goal of this project is to study and develop a non-cyclooxygenase inhibitory amide derivative of sulindac for colorectal cancer chemoprevention and optimize formulations to improve oral bioavailability.

3R01CA155638-04S1 (Piazza) 8/1/15 - 7/31/17 0 calendar
NIH/NCI Diversity Supplement to Dr. Luciana Barnes $121,281
Title: PDE5, a novel target and inhibitor for breast cancer chemoprevention
Role: Principal Investigator (PI)
Description: Role of PDE10 in ovarian cancer was explored.

1R43CA189613-01A1 (Canzoneri and Piazza) 4/1/2015 - 3/31/2016 1.2 calendar

NIH/NCI $225,000
Title: A novel phosphodiesterase target isozyme and class of inhibitors for lung cancer
Role: Principal Investigator (MPI)
Description: A series of novel PDE10 inhibitors will be synthesized and evaluated for therapeutic efficacy using a mouse orthotopic model of lung cancer.

Contract research (Piazza) 11/1/16-3/30/17 1.2 calendar
Palobiofarma $50,000
Title: Evaluate Palobiobarma's PDE10 inhibitor (PBF999) for *in vitro* anticancer activity and target specificity
Role: Principal Investigator (PI)
Description: The goal was to examine the effects of a PDE10 inhibitor, PBF999 on tumor cell growth, protein kinase G activation and suppression of β-catenin levels in cancer cell lines.

1 R21CA182941-01(Piazza and Zhu) 2/1/15 - 1/31/17 1.2 calendar
NIH/NCI $362,029
Title: PDE inhibition by sulindac sulfide amide derivatives for lung cancer chemoprevention
Role: Principal Investigator (MPI, Contact)
Description: This project will evaluate the efficacy, mechanism, and toxicity of a novel sulindac derivative referred to as methoxy-sulindac sulfide amide in a mouse model of chemical-induced lung tumorigenesis.

1 R21CA160280-01 (Xi and Piazza) 03/01/12-02/29/15 0.6 calendar
NIH/NCI $345,597
Title: MicroRNA, sulindac and breast cancer chemoprevention
Role: Principal Investigator (MPI)
Description: The goal of this application was to determine changes in microRNA expression levels in human breast tumor cells treated with sulindac to study of mechanism action as it relates to inhibitory effects on tumor growth and invasion.

3 R01CA155638-02S1 (Piazza) 9/20/12-8/31/15 0.6 calendar
NIH/NCI Administrative Supplement $160,041
Title: PDE5, a novel target and inhibitor for breast cancer chemoprevention
Role: Principal Investigator (PI)
Description: The goal of this project was to utilize a metabolomic approaches to study mechanism of action of novel anticancer agents.

UAB Breast Cancer SPORE Pilot Grant (Piazza) 10/1/2014 - 9/30/2015 1.2 calendar
Ras inhibitory drugs for breast cancer $100,000
Role: Principal Investigator
Description: The aims were to evaluate a novel series of sulindac that show high potency and selectivity to inhibit breast tumor cells with mutant RAS.

1 R01CA131378-01 (Piazza and Reynolds) 1/01/08-12/30/13 3.6 calendar
NIH/NCI $1,787,078
Sulindac Derivatives for Colon Cancer Chemoprevention
Role: Principal Investigator (MPI)
Description: The aims were to synthesize and test novel sulindac derivatives for colon cancer chemoprevention.

R464-CR11 (Sorscher and Piazza) 7/1/11-6/30/13 0.6 calendar

Cystic Fibrosis Foundation $144,000
Spectral domains optical tomography for the functional characterization of ion transport modulators
Role: Sub-award Principal Investigator
Description: The aims of the project were to develop instrumentation that is capable of screening compound libraries for activity in live cells derived from patients with cystic fibrosis.

1 R21 NS067693-01 (Chung) 1/10/10-12/31/11 0.6 calendar
NIH $100,000
A Novel HTS Cell-Based Imaging Assay to Identify Chemical Correctors for ΔF508-C
Role: Co-Investigator
Description: The aims were to develop an image-based high content screening assay for cystic fibrosis.

1R21CA137519-01(Prasain) 9/1/10-8/31/11 0.6 calendar
NIH/NCI $275,000
Urinary metabolites of cranberry that protect against bladder cancer
Role: Co-Investigator
The aims were to conduct high content analysis of human bladder tumor cells treated with urinary fractions from rats fed a cranberry diet to assess anticancer properties and identify active metabolites.

Breast Cancer Research Program (Reynolds) 5/01/07-4/30/11 0.6 calendar
Department of Defense $325,000
Novel Sulindac Sulfide Derivatives for Breast Cancer Chemoprevention
Role: Co-Investigator
Description: The aims were to use high throughput parallel synthesis to generate novel non-cyclooxygenase derivatives of sulindac sulfide for breast cancer chemoprevention.

1 R03CA128021-01 (Piazza) 04/01/07-03/31/11 0.6 calendar
NIH/NCI $100,000
A Novel Sulindac Derivative for Colon Cancer Chemoprevention
Role: Principal Investigator
Description: The aims were to study the colon chemopreventive properties of a novel sulindac sulfide derivative that lacks cyclooxygenase inhibitory activity.

1 R21NS059509-01 (Piazza) 04/01/07-03/31/09 1.2 calendar
NIH/NINDS $125,000
A Novel HTS Cell-Based Assay for cGMP
Role: Principal Investigator
Description: The aims were to develop a HTS assay to quantify intracellular cyclic GMP levels in cells.

UAB Breast Cancer SPORE Pilot Grant (Piazza) 3/1/08-8/31/09 0.6 calendar
Evaluation of SRI 21009 for Breast Cancer Chemoprevention $50,000
Role: Principal Investigator
Description: The aims were to evaluate a novel derivative of sulindac for breast cancer chemoprevention.

1 U54 HG003917-01 (Piazza) 07/01/05-06/30/08 6.0 calendar
NIH/NHGRI $6,497,600
An Integrated HTS Approach for the Molecular Library Screening Center Network Initiative

Role: Principal Investigator
Description: The aims of this interdisciplinary project, which involved assay development, high throughput screening, synthetic chemistry, and cheminformatics, was to identify novel small molecule probes for the scientific community to study physiological and disease processes.

1 X01MH077620-01 (Piazza) 04/01/06-03/31/07 0 calendar
NIH/NINDS Resources
Identification of Molecular Probes that Reverse MRP-Mediated Drug Resistance
Role: Principal Investigator
Description: The aims of this project were to identify compounds that reverse multi-drug resistance.

1 R03CA107790-01 (Piazza) 04/01/04-03/31/06 0.6 calendar
NIH/NCI $100,000
cGMP Phosphodiesterase, A Novel Chemoprevention Target
Role: Principal Investigator
Description: The aims were to study a novel cyclooxygenase independent mechanism for the cancer chemopreventive properties of NSAIDs involving cGMP phosphodiesterase inhibition.

COMMERCIAL AND GOVERNMENT CONTRACTS (from 2001-2011)

NINDS	*Deciphera*	*Ariad*	*Tapestry*	*SAIC*
Battelle	*KuDOS*	*Ambit*	*King*	*Biogen*
Lilly	*MGI Pharma*	*Nektar*	*Aventis*	*Biomedicine*
Bristol Myers	*Sonus*	*Titan*	*Cerylid*	*Cystic Fibrosis Foundation*