

## CURRICULUM VITAE

### BIOGRAPHICAL

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### EDUCATION AND TRAINING

#### Undergraduate

1964-1970	University of Illinois Chicago, Illinois	B.S.	1970	Biology
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#### Graduate

1970-1973	Texas Southern University Houston, Texas	M.S.	1973	Biology
1974-1980	University of Iowa Iowa City, Iowa	Ph.D.	1980	Anatomy

#### Post-Graduate

1980-1982	University of California Riverside, California	Postdoctoral Trainee		Molecular Cellular Endocrinology
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### APPOINTMENTS AND POSITIONS

#### Academic

1970-1972	Texas Southern University Houston, Texas	Teaching Assistant
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1972-1973	Texas Southern University Houston, Texas	Instructor
1973-1978	Department of Anatomy University of Iowa Iowa City, Iowa	Teaching Assistant
1982-1988	Department of Neurobiology Anatomy and Cell Science University of Pittsburgh School of Medicine Pittsburgh, Pennsylvania	Assistant Professor
1988-1993	Department of Neurobiology Anatomy and Cell Science University of Pittsburgh School of Medicine Pittsburgh, Pennsylvania	Associate Professor
1991-1992	Scripps Research Institute Molecular Biology La Jolla, California	Sabbatical (Dr. Norton B. Gilula's laboratory)
1993-1999	Department of Cell Biology University of Pittsburgh School of Medicine Pittsburgh, PA	Associate Professor
July - August, 1995	Communications Cellulaires et Differentiation Hopital Debrousse (INSERM-INRA U 418) LYON FRANCE	Visiting Scientist
May - June 1996	Minister of Defense Health Officers Institute Addis Ababa, Ethiopia	Adjunct Professor
October 1999 - present	Department of Cell Biology University of Pittsburgh School of Medicine Pittsburgh, PA	Professor
June – August, 2001	Department of Pediatrics, Obstetrics and Medicine of Reproduction University of Siena Siena, Italy	Visiting Scientist

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MEMBERSHIPS IN PROFESSIONAL AND SCIENTIFIC SOCIETIES

American Society for Cell Biology, Minorities Affairs Committee	1995-Present
American Society for Cell Biology, Council	1998-2001
Society for In Vitro Biology, Member	1986-Present
The Pittsburgh Cancer Institute, Member	1986-Present
Corporation of the Marine Biological Laboratory, Woods Hole, MA, Member	1990-Present
Cell Transplant Society, Member	1991-Present
The Endocrine Society, Student Affairs Committee (1996-1998) Chairman, International Science & Engineering Fair Judges 1997 Publications Comm.(2000-2004)	1991-Present
American Physiological Society, Member	1996-Present
International Society for Preventive Oncology, Member	1999-Present

HONORS

Achievement Leadership and Character Award for outstanding contribution to Texas Southern University.	1971-72
Research Award - Beta Kappa Chi National Science Meeting, Bishop College, Dallas, Texas.	1972
Research Award - Beta Beta Beta Biological Honor Society, Southwest and Central District Convention, Hunt Texas.	1972
Ford Foundation National Fellowship Fund Dissertation Year Grant.	1977-78
Nominated for the Chancellor's Distinguished Teaching Award.	1983-84
The American Society for Cell Biology - Travel Grant to invited speakers to the Third International Congress on Cell Biology, Tokyo, Japan.	1984
Japanese National Institute of Physiological Science - Travel Award for the International Symposia on Intercellular Junctions, Okazaki, Japan.	1984
American Society for Cell Biology Travel Award for the American Society for Cell Biology Annual Meeting, Atlanta, Georgia	1985
American Society of Biological Chemists - Travel Grant	1985

to the 13th International Union of Biochemistry (IUB)  
Congress in Amsterdam, The Netherlands.

American Society of Cell Biology - Award to do research at the Marine Biological Laboratories, Woods Hole, Massachusetts.	Summer, 1986-1989
American Society of Cell Biology - Award for training course entitled "Molecular Endocrinology and Techniques for Hormone Action" Baylor College of Medicine, Houston, Texas.	1988
Recipient of 1989 SNMA Outstanding Faculty Award - Medical Black Bag Award.	1989
Saluted by the National Technical Association of Scientists and Engineers as one of the <i>Top 50 Minority Women Scientists</i> .	1996
McDonald Award in my name presented to talented students for Academic Excellence.	1995-1996
City of Pittsburgh City Council Achievement Award	1996
The Howard University Distinguished Scientists Outstanding Achievement Award For Contributions to the Field of Cell Biology	1996
Named the 15th Daniel T. Rolfe Scholars Lecture- MeHarry Medical College, Nashville Tenn.	1996
Nomination to run and Elected to the Council of the American Society for Cell Biology	1998
City of Pittsburgh Trailblazer Award	
American Society of Cell Biology E.E. Just Award	2004
Science 2008 Conference, First Place Award for Poster Presentation	2008
University of Pittsburgh African American Alumni Council Sankofa Award for Mentoring	2008
Received the Mentor of the Year Award, from The Institute of Teaching and Mentoring.	2014
Nominated for the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, 2015 (Final Selection to be made 2016).	2015

**Featured in the following:**

*No Universal Constants: Personal Stories of Women in Science and Engineering*, (B. Lazarus, S. Ambrose and I. Nair)  
Temple University Press.

*Distinguished African American Scientists of the 20<sup>th</sup> Century*.  
The Oryx Press of Phoenix, Arizona.

Journal of the NTA National Technical Association. Sept. 1996

Profile in the American Society for Cell Biology News Letter  
Vol. 20, number 6, June 1997

<http://www.ascb.org/ascb/news/vol20no6/contents.html>

and EE Just Award Recipient profile 2004-

<http://www.ascb.org/mac-ee-just-lectureship-2004/>

Featured in the Diversity Video produced by the University of Pittsburgh.

Profile Featured in *Notable Black American Scientists*, (Kristine Krapp), 1998  
Gale Cengage.

Profile Featured in *Science, Math and Invention*, 2003  
(Ray Spangenburg and Kit Moser), Facts on file, Inc.

Featured in Blue, Gold, & Black, 2010,  
<http://www.chancellor-emeritus.pitt.edu/sites/default/pdfs/BlueGoldBlack2004.pdf>

Selected by NIH as one of the Biomedical Faces of Science Mentors 2010- Present

Profile Featured in *American Women of Science Since 1900, Volume 1*, 2011  
Tiffany K Wayne, ABC-CLIO, LLC

Profile featured in NSF Molecular and Cellular Biology Newsletter Blog 2015  
for Principal Investigator Spotlight  
<https://nsfmcb.wordpress.com/2015/01/15/principal-investigator-spotlight-dr-sandra-murray/>

## PUBLICATIONS

### Refereed articles

1. Decker, R., Donta, S.T., Larsen, W.J., and **Murray, S.A.** Gap junctions and ACTH sensitivity in Y-1 adrenal tumor cells. **J. Supramolecular Structure** 9:497-507, 1978.
2. Larsen, W.J., Tung, H., **Murray, S.A.**, and Swenson, C.A. Evidence for the participation of actin microfilaments and bristle coats in the internalization of gap junction membrane. **J. Cell Biol.** 83:576-587, 1979.
3. **Murray, S.A.**, Larsen, W.J., Trout, J., and Donta, S.T. Gap junction assembly and endocytosis correlated with patterns of growth in a cultured adrenocortical tumor cell (SW-13). **Cancer Res.** 41:4063-4073, 1981.
4. **Murray, S.A.** and Fletcher, W.H. Multiparameter morphology as a means of specifically identifying hormone

- stimulated adrenal cortical tumor cells (Y-1) and granulosa cells in coculture. **Scanning Electron Microscopy** 1:401-407, 1984.
5. **Murray, S.A.**, and Fletcher, W.H. Hormone induced intercellular signal transfer dissociates cAMP-dependent protein kinase. **J. Cell Biol.** 98:1710-1720, 1984.
  6. **Murray, S.A.**, Byus, C.V., and Fletcher, W.H. Intracellular kinetics of free catalytic units dissociated from adenosine 3',5'-monophosphate-dependent protein kinase in adrenocortical tumor cells (Y-1). **Endocrinology** 116:364-374, 1985.
  7. **Murray, S.A.**, and Fletcher, W.H. Cyclic-AMP-dependent protein kinase mediated desensitization of adrenal tumour cells. **Molecular and Cellular Endocrinology** 47:153-161, 1986.
  8. **Murray, S.A.**, Champ, C., and Lagenaur, C. Ultrastructural localization of cyclic adenosine 3',5'-monophosphate-dependent protein kinase after adrenocorticotropin stimulation in adrenal cortical tumor cells. **Endocrinology** 120: 1921-1927, 1987.
  9. **Murray, S.A.**, and Taylor, F. Dibutyryl cyclic AMP modulation of gap junctions in SW-13 human adrenal cortical tumor cells. **Amer. J. Anat.** 181:141-148, 1988.
  10. **Murray, S.A.**, and Tung, H.N. Effects of cytochalasin B and colchicine on the morphology of SW-13 human adrenal cortical tumor cells in culture. **Scanning Microscopy** 2:1079-1087, 1988.
  11. **Murray, S.A.**, and Polizotto, S. Characterization of the morphological growth, and steroidogenic effect of TPA on mouse Y-1 adrenal cortical tumor cells in culture. **Amer. J. Anat.** 183:166-177, 1988.
  12. Hernandez, W., Berry, D., Baccetti, B., Ahluwalia, B., **Murray, S.A.**, and Anderson, W.A. Remodelling of the nucleocytoplasm as a consequence of the acrosomal reaction of the spider crab sperm. **J. Submicrosc. Cytol. Pathol.** 21:163-186, 1989.
  13. Billiar, T.R., Curran, R.D., Stuehr, D.J., Stadler, J., Simmons, R.L., and **Murray, S.A.** Inducible cytosolic enzyme activity for the production of nitrogen oxides from L-arginine in hepatocytes. **Biochem. Biophys. Res. Comm.** 168:1034-1090, 1990.
  14. **Murray, S.A.**, Gesiotto, J., Perez, R., Baccetti, B., and Anderson, W. Polyethylene glycol induced fusion of crustacean and rat liver cells in culture. **Comparative Spermatology 20 Years After** 75:575-579, 1991.
  15. McCauley, J., Farkas II, Z., Prasad, S.J., Plummer III, H.K. and **Murray, S.A.** Cyclosporine A and FK 506 induced inhibition of renal epithelial cell proliferation. **Trans. Proceedings** 23:2829-2830, 1991.
  16. Prasad, S.J., McCauley, J., Salama, G., Starzl, T.E., and **Murray, S.A.** In vitro effect of CyA and FK 506 on the rabbit renal cortex. **Trans. Proceedings** 23:3128-3129, 1991.
  17. McCauley, J., Studer, R., Craven, P., and **Murray, S.A.** The effects of cyclosporine A, cyclosporine G, and FK 506 on prostaglandin production in renal mesangial cells. **Trans. Proceedings** 23:3141-3142, 1991.
  18. Plummer III, H.K., Dillard, C.Y., and **Murray, S.A.** Hoeschst 33342 for microfluorimetric measurement of adrenocortical tumor cell proliferation. **In Vitro Cell. Dev. Biol.** 28A:4-6, 1992.
  19. Billiar, T.R., Curran, R.D., Harbrecht, B.G., Stadler, J., Williams, D.W., Ochoa, J.B., Di Silvio, M., Simmons,

- R.L., and **Murray, S.A.** Association between synthesis and release of cGMP and nitric oxide biosyntheses by hepatocytes. **Amer. J. Physiol.** 262:c1077-1082, 1992.
20. **Murray, S.A.**, Plummer III, H.K., Leonard II, E.E. and Deshmukh, P. Regulation of TPA induced inhibition of intercellular communication. **Anat. Rec.** 235:1-11, 1993.
  21. **Murray, S.A.**, Kumar, N.M., and Gilula, N.B. Gap junction expression in rat adrenal gland. Intercellular communication through gap junctions: **Progress in Cell Research**. Vol.4 Eds. Y. Kanno, K. Kataoka, Y. Shiba, Y. Shibata and T. Shimazu: Pages 293-296, 1995.
  22. **Murray, S.A.**, Oyoyo, U., Pharrams, S. Kumar, N.M. and N.B. Gilula. Characterization of gap junction expression in the adrenal gland. **Endocrine Research**. 21:221-229, 1995.
  23. **Murray, S.A.**, and Pharrams, S. Comparison of gap junction expression in the adrenal gland. **Microscope Res. and Tech.** 36:510-519, 1997.
  24. **Murray, S.A.**, Williams, S.Y., Dillard, C.Y., Narayanan, S.K., and McCauley, J. Relationship of Cytoskeletal Filaments to Annular Gap Junction Expression in Human Adrenal Cortical Tumor Cells in Culture. **Exp. Cell Res.** 234:398-404, 1997.
  25. Oyoyo, U., Shah, U.S., and **Murray, S.A.**, The Relationship Between  $\alpha_1$  Connexin-43 Gap Junction Expression in Adrenal Cortical Cell Function. **Endocrinology**, 138:5385-5397, 1997.
  26. **Murray, S.A.**, Modulation of Adrenal Gap Junction Expression-Paracrine and Neuroendocrine Regulation of the Adrenal Cortex, Hormone and Metabolic Research. **Experimental Endocrinology and Metabolism**. 30:426-431, 1998.
  27. **Murray, S.A.**, Davis, K., Fishman, L.M., and Bornstein, S.R. Connexin 43 Gap Junctions are Decreased in Human Adrenocortical Tumors. **J. Clin. Endocrinology Metab.** 85:890-895, 2000.
  28. Davis, K.T., McDuffie, L., Mawhinney, L., and **Murray, S.A.** Hypophysectomy Results in a Loss of Connexin 43 Gap Junction from the Adrenal Cortex. **Endocrine Research** 26:561-570, 2000.
  29. Shah, U.S., and **Murray, S.A.** Bimodal Inhibition of Connexin 43 Gap Junctions Decreases ACTH-Induced Steroidogenesis and Increases Bovine Adrenal Cell Population Growth. **Journal of Endocrinology** 171:199-208, 2001.
  30. Davis, K.T., Prentice, N., Gay, V.L., and **Murray, S.A.** Gap Junction Proteins and Cell-Cell Communication in the Three Functional Zones of the Adrenal Gland. **Journal of Endocrinology**, 173:13-21, 2002.
  31. Wynn, J., Shah, U.S., and **Murray, S.A.** Redistribution of Connexin 43 by cAMP: A Mechanism for Growth Control in Adrenal Cells. **Endocrine Research** 28:663-668, 2002.
  32. **Murray, S.A.**, Davis, K., and Gay, V. ACTH and Adrenocortical Cell Gap Junctions. **Microscopy Research and Technique** 61:240-246, 2003.
  33. **Murray, S.A.**, Nickel, B.M., and Gay, V.L. Endocytosis of Connexin Protein in Adrenal Cells. **Endocrine Research** 30(4):647-654, 2004.
  34. Vinson, G., and **Murray, S.A.** Metabolic Connections. **Endocrine Research** 30:851-853, 2004.

35. Gugssa, A., Lee, C.M., Gebru, S., Desta, D., **Murray, S.A.**, Baccetti, B., and Anderson, W. “Co-culture of Trypanosoma musculi with Spleen-derived Adherent Fibroblasts: Possible transmission of small molecules via Connexons”. **Journal of Submicroscopic Cytology and Pathology**. 37(3-4):223-229, 2005.
36. Leaphart, C.L., Qureshi, F., Cetin, S., Li, J., Dubowski, T., Batey, C., Beer-Stolz, D., Guo, F., Nickel, B., **Murray, S.A.**, Hackam, D.J. Interferon-gamma Inhibits Intestinal Restitution by Preventing Gap Junction Communication Between Enterocytes. **Gastroenterology**. 132(7):2395-2411.PMID: 17570214, 2007.
38. DeFranco, B.H., Nickel, B.M., Baty, C.J., Martinez, J.S., Gay, V.L., Sandulache, V.C., Hackam, D.J., and **Murray, S.A.** Migrating Cells Retain Gap Junction Plaque Structure and Function. **Cell Communication and Adhesion**. 15:273-288, 2008.
39. Nickel, B.M., DeFranco, B.H., Gay, V.L., and **Murray, S.A.** Clathrin and Cx43 Gap Junction Plaque Endoexocytosis. **Biochem Biophys Res Commun**. 374:679-682, 2008.
40. **Murray, S.A.**, Nickel, B.M. and Gay, V.L. Gap Junctions as Modulators of Adrenal Cortical Cell Proliferation and Steroidogenesis. **Mol Cell Endocrinol**. 300:51-56, 2009..
41. **Murray, S.A.**, Nickel, B.M. Gay., V.L., and DeFranco, B.H. Assessment of Clathrin-Mediated Annular Gap Junction Formation in Atypical Adrenal Cells. **13th International Congress of Endocrinology**. 433-38, 2008.
42. Ogunkoya, Y., Nickel, B. M., Gay, V. L., and **Murray, S.A.** A New Ultrastructural Approach To Visualizing Clathrin Associations. **Biotechnic & Histochemistry**. 84(3):109-15, 2009.
43. Balut, C.M., Gao, Y., **Murray, S.A.**, Thibodeau, P.H., and Devor, D.C. ESCRT-dependent targeting of plasma membrane localized KCa3.1 to the lysosomes. **Am J Physiol Cell Physiol**. 299(5):C1015-27, 2010.
44. Zhang, J., Grindstaff, R.D., Thai, S.F., **Murray, S.A.**, Kohan, M., and Blackman, C.F. Chloral hydrate decreases gap junction communication in rat liver epithelial cells. **Cell Biol Toxicol**. 27(3):207-16, 2011.
45. Anderson, A., **Murray, S.A.**, Thompson, W., and Eribo, B. A Discussion of Mentoring in the Science, Technology, Engineering, and Mathematics (STEM) Fields: A Tribute to Morris Karnovsky and James Jamieson **ASCB News letter**. 34(5), 2011.
46. Nickel, B., Boller, M., Schneider, K., Shakespeare, T., Gay, V. and **Murray, S. A.** Visualizing the effect of dynamin inhibition on annular gap vesicle formation and fission. **J Cell Sci** 126 Pt 12, 2607-16, 2013.
47. Campbell, A.G., Leibowitz, M.J., **Murray, S.A.**, Burgess, D., Denetclaw, W.F., Carrero-Martinez F.A., and Asai, D.J. Partnered Research Experiences for Junior Faculty at Minority-Serving Institutions Enhance Professional Success. **CBE—Life Sciences Education** 12:394–402, 2013.
48. Shakespeare, T. I., O'Neil, S.J., Nickel, B., and **Murray, S.A.** Life and Times of the Annular Gap Junction: Morphological and Dynamic Changes, Submitted, 2013.
49. Falk, M.M., Bell, C.L., Kells Andrews, R.M., and **Murray, S.A.** Formation, Trafficking and Processing of Annular Gap Junctions, **BMC Cell Biology Journal, Section: Cell-Cell Contacts & Adhesion** 17:5-23, 2016, Doi: 10.1186/s12860-016-0087-7.
50. **Murray, S.A.**, and Shakespeare, T.I. Immunofluorescence: application for analysis of connexin distribution and



trafficking. **Gap Junction Channels and Hemichannels**. Boca Raton, FL: CRC Press. Taylor & Francis Group (2016), pp. 1-19. ISBN: 9781498738620.

51. Vanderpuye, V.O., Bell, C.L., and **Murray, S.A.**, Dynamic Redistribution of Connexin 43 During Cell Division. **Cell Biology International** 40(4):387-96, 2016, doi: 10.1002/cbin.10576.
52. Bell, C.L., and **Murray, S.A.** Adrenocortical Gap Junctions and Their Functions. **Frontier in Endocrinology** **2016 ACTH** action in the Adrenal Cortex: From Molecular Biology to Pathophysiology 29:1-13, 2016, doi. 10.3389/fendo.2016.00082.

#### Published Abstracts

1. **Murray, S.A.**, Larsen, W.J., and Donta, S.T. ACTH responsiveness and gap junctions in Y-1 tumor cells. **J. Supramolecular Structure** **8**, Supplement 2, 1978.
2. **Murray, S.A.**, Larsen, W.J., and O'Donnell, S. Interiorization of gap junctions and cell dissociation of SW-13 adrenal cortical adenocarcinoma in culture. **Anat. Rec.** 190:489, 1978.
3. **Murray, S.A.** The relationship of gap junctions to cell behavior in cultured human adenocarcinoma of the adrenal cortex. **Anat. Rec.** 193:632, 1979.
4. Larsen, W.J., Tung, H., Risinger, M.A., and **Murray, S.A.** Microfilament facilitated endocytosis and degradation of gap and tight junctions. **J. Cell Biol.** 83:323, 1979.
5. **Murray, S.A.** and Larsen, W.J. Modulation of gap junctions in a cultured adrenal cortical adenocarcinoma (SW-13) cell line. **Anat. Rec.** 196:132, 1980.
6. **Murray, S.A.**, Byus, C.V., and Fletcher, W.H. The influence of cAMP-dependent protein kinase on steroidogenesis and morphological changes in adrenocortical tumor cells (Y-1) in culture. **J. Cell Biol.** 87:1244a, 1980.
7. **Murray, S.A.**, Byus, C.V., and Fletcher, W.H. Cellular localization of cAMP-dependent protein kinase in adrenocortical tumor cells and granulosa cells in coculture. **J. Cell Biol.** 91:117a, 1981.
8. **Murray, S.A.**, Byus, C.V., and Fletcher, W.H. Decreased steroid production in ACTH-pretreated Y-1 adrenal tumor cells related to cAMP-dependent protein kinase activation. **Anat. Rec.** 202:134A, 1982.
9. Strike, L.E., **Murray, S.A.**, Fletcher, W.H., and Lundak, R.L. Evaluation of immunoglobulin-secreting human-human hybridomas by scanning electron microscopy. **Federation Proceedings** 41:594, 1982.
10. **Murray, S.A.**, and Fletcher, W.H. Contact dependent signal transfer that leads to cAMP-dependent protein kinase dissociation. **J. Cell Biol.** 95:99a, 1982.
11. **Murray, S.A.**, Byus, C.V., and Fletcher, W.H. Growth regulation of Y-1 adrenal cortical tumor and ovarian granulosa cells in coculture. **J. Cell. Biochem.**, Suppl. 6, 1982.
12. **Murray, S.A.** The influence of colchicine, cytochalasin B and tetracaine on SW-13 human adrenal cortical tumor cells morphology. **Anat. Rec.** 208:123a, 1984.

13. **Murray, S.A.** Growth regulation and modulation of gap junctional membrane in cultured SW-13 human adrenocortical tumor cells by dibutyryl cyclic-AMP administration. *International Cell Biology*, (Tokyo, Japan) **Third International Congress on Cell Biology** 3:316A, 1984.
14. **Murray, S.A.,** and Champ, C. Ultrastructural localization of cAMP-dependent protein kinase with immunogold technique. *J. Cell Biol.* 101:355, 1985.
15. **Murray, S.A.,** Drazba, J., Champ, C., and Fletcher, W.H. The role of cyclic-AMP dependent protein kinase in mediation of desensitization of adrenal tumor cells. **13th International Congress of Biochemistry**, Amsterdam, The Netherlands, 782, 1985.
16. **Murray, S.A.,** and Novak, C. The effect of TPA on the morphology, steroidogenesis and growth rate of Y-1 adrenal cortical tumor cells in culture. *J. Cell Biol.* 103:348, 1986.
17. **Murray, S.A.,** Lagenaur, C., Tolbert, W.D., and Thomas, M.H. Ultrastructural localization of the heat stable inhibitor cAMP dependent protein kinase in cultured adrenal cortical tumor cells. *J. Histochem. and Cytochem.* 35:1026, 1987.
18. **Murray, S.A.,** and Polizotto, S. Trifluoperazine, a calmodulin inhibitor, modulates the inhibition of cell-cell communication induced by a tumor promoter. *Anat. Rec.* 222:65, 1988.
19. **Murray, S.A.,** Polizotto, S.L., Powell, G., and Smalls, A. The role of cAMP-dependent protein kinase in TPA induced steroidogenesis. *J. Cell Biol.* 107:493, 1988.
20. Langford, G.M., **Murray, S.A.,** Hefflin, B., and Penny, K.L. Quantitative motion analysis of vesicle movement in Y-1 adrenocortical cells and the use of fluorescent probes to identify the organelles. *Biol. Bull.* 177:313, 1989.
21. McCauley, J., Ptachcinski, R., and **Murray, S.A.** Cyclosporine (CYA) inhibits the proliferation of LLC-PK1 cells in culture. *Kidney International* 35:507, 1989.
22. Billiar, T.R., Curran, R.D., and **Murray, S.A.** A role for endogenous nitric oxide in the activation of guanylate cyclase in hepatocytes. *FASEB J.* 4:4969, 1990.
23. Langford, G.M., Weiss, D.G., Leonard, E., and **Murray, S.A.** Microtubule-dependent organelle motility in Y-1 adrenal cells during steroidogenesis. *J. Cell Biol.* 111:2352, 1990.
24. Plummer III, H.K., Bygrave, M.A., Dillard, C.Y., and **Murray, S.A.** Inhibitor of cyclic AMP-dependent protein kinase decreases steroid production and growth in Y-1 cells. *J. Cell Biol.* 111:494, 1990.
25. Langford, G.M., Leonard, E., Weiss, D.G., and **Murray, S.A.** Effects of cAMP-dependent protein kinase inhibitor on organelle movement in Y-1 adrenocortical tumor cells. *Biol. Bull.* 179:1990.
26. Billiar, T.R., Curran, R.D., Stadler, J., Harbrecht, B.G., Di Silvio, M., Simmons, R.L., and **Murray, S.A.** Cytokine-induced synthesis and release of cGMP by hepatocytes is mediated by nitric oxide. *FASEB J.* 5:A1344, 1991.
27. Dillard, C.Y., and **Murray, S.A.** Concentration dependent A-kinase dissociation and cell proliferation on Y-1 adrenal tumor cells. *Endocrine Society Meetings* 73:65(139a), 1991.
28. **Murray, S.A.,** Polizotto, S., Plummer III, H., Smith, J.F., and Deshmukh, P. Modulation of the TPA-induced

- inhibition of cell-cell communication. **Anat. Rec.** 229:4(62a), 1991.
29. Plummer III, H.K., Bygrave, M.A., Leonard II, E.E., Pharrams, S.Y., and **Murray, S.A.** Protein kinase inhibitors affect TPA-induced suppression of cell-cell communication. **J. Cell Biol.** 115:193a, 1991.
  30. **Murray, S.A.**, Kumar, N.M., and Gilula, N.B. Gap junction expression in the adrenal gland. **Mol. Bio. Cell.** 3:293a, 1992.
  31. **Murray, S.A.**, Oyoyo, U.A., Pharrams, S.Y., Kumar, N.M., and Gilula, N.B. Modulation of gap junction expression in rat and human adrenal cortical cells in culture. **Anat. Rec.** 1:86, 1993.
  32. Hebda, P.A., Kruse, S.A., and **Murray, S.A.** The keloid fibroblast phenotype abnormal morphology and motility. **J. of Inv. Dermatology** Vol 102, 1994.
  33. Leonard, E.E., and **Murray, S.A.** Corticosteroid-mediated inhibition of cell proliferation and ACTH-induced protein kinase-A activation. **Mol. Bio. Cell** 4:357a, 1993
  34. Dillard, C.Y., and **Murray, S.A.** The effect of TPA and DbcAMP on adrenal cortical cell gap junction. **Mol. Bio. Cell** 4:328a, 1993.
  35. Williams, S.Y., Hargrove, K.D., and **Murray, S.A.** Sulfotransferase localization in adrenocortical cells. **Mol. Bio. Cell** 5:117a, 1994.
  36. **Murray, S.A.**, Oyoyo, U., Pharrams, S., and Sherman, S. Gap Junction Expression and Cell Proliferation in the adrenal gland. **76<sup>th</sup> Annual Meeting of Endocrine Society**, Anaheim, CA, 1994
  37. Dillard, C.Y., Narayanan, S.K., Dennis, W.F., and **Murray, S.A.** The role of dibutyl cyclic adenosine monophosphate and cytoskeletal elements in annular gap junction distribution in human adrenal cortical tumor (SW-13) cells. **Mol. Bio. Cell** 5:199a, 1994.
  38. Oyoyo, U.A., Pharrams, S.Y., and **Murray, S.A.** Gap Junctional Regulation of Adrenal Cortical Function. **77<sup>th</sup> Annual Meeting of Endocrine Society**, Washington, D.C., June, 1995.
  39. Williams, S.Y., Dillard, C.Y., and **Murray, S.A.** The Effects of Dibutyl Cyclic AMP (DbcAMP) and 12-O-Tetradecanoyl-Phorbol-13-Acetate (TPA) on Sulfotransferase Expression in Human Adrenocortical Tumor Cells. **FASEB J.** 9:A69, 1995.
  40. **Murray, S.A.** Oyoyo, U.A., and Pharrams, S.Y. The Role of Gap Junction Expression in Adrenal Cortical Function and Proliferation. Presented at the **International Gap Junction Conference**, The Role of Connexin Diversity, L'Ile des Embiez, France, 1995.
  41. Jules, C., Williams, S.Y., Engeland, W.C., and **Murray, S.A.** Gap Junction Expression in Regenerating Rat Adrenal. **10<sup>th</sup> International Congress of Endocrinology Program & Abstracts**, San Francisco, CA, p. 592 #P2-752, June, 1996.
  42. Williams, S., Donald, C., Faulcon, L., Cooke, D. III, and **Murray, S.A.** The Effect of Dibutyl 3'-5' Cyclic Adenosine Monophosphate (DbcAMP) Treatment on Connexin 43 (a1) Expression in Dunning Rat Prostate Cell Clones. **Mol. Bio. Cell.** 7:279a, 1996.
  43. Shah, U.S., and **Murray, S.A.** Gap Junction Inhibition by 18 Alpha-Glycerrhetic Acid (GA) Effects the

- Steroidogenic Response of Bovine Adrenal Cells to ACTH. **79<sup>th</sup> Annual Meeting of the Endocrine Society**, 1997.
44. Shah, U.S., Gipson, D.I., and **Murray, S.A.** Role of Gap Junction Expression in the Adrenocortical Response. **Mol. Bio. Cell.** 8:416a, 1997
  45. Davis, K.T., Shah, U.S., Brown, A.E., and **Murray, S.A.** Connexin Expression in Human Adrenal and Prostate Tumors Connexin 43 (  $\square$  ) Protein Expression in Human Adrenal and Prostate Tumors. **Impact of Biotechnology on Cancer Prediction, Prevention and Treatment**, Nice France, Oct. 24-28, 1998.
  46. Davis, K.T., Shah, U.S., Brown, A.E., and **Murray, S.A.** The role of Alpha 1 (Connexin 43) Gap Junction Protein in Mouse Adrenal Gland Development. **Mol. Bio. Cell.**, 1998.
  47. **Murray, S.A.**, Shah, U. S., and Diaz, S. DbcAMP modulated changes in gap junction distribution in adrenal and rat prostate tumor cells. *Cancer Detection & Prevention, Impact of Cancer Biotechnology on Diagnostic and Prognostic Indicators in Predictive Oncology and Therapy.* **22 Supplement** 1:S-78, 1998.
  48. **Murray, S.A.**, Davis, K.T., Shah, U.S., and Bornstein, S.R. Connexin 43 (  $\square$  ) Protein Expression in Human Adrenal Tumors. **Cell Adhesion and Communication in Growth Control and Cancer Meeting** in Lyon, France, Jan., 1999.
  49. **Murray, S.A.**, Davis, K.T., Mawhinney, L., and McDuffie, I. Hypophysectomy Results in a Loss of Connexin 43 Gap Junction from the Adrenal Cortex. **International Gap Junction Conference** in Gwatt, Switzerland, Aug. 28-Sept. 2, 1999.
  50. Shah, U.S., Davis, K., and **Murray, S.A.** The Impact of Connexin Expression Changes in the Adrenal Gland on Cell Function. **Adrenal Cortex Conference** in Toronto, Canada, June, 2000.
  51. Davis, K.T., Fishman, L.M., Bornstein, S.R., and **Murray, S.A.** Loss of Gap Junctions in Human Adrenal Cortical Tumors. **80<sup>th</sup> Endocrine Society Meeting** in Toronto, Canada, June, 2000.
  52. Davis, K.T., Prentice, N., and **Murray, S.A.** Zone Specific Gap Junction Mediated Communication in the Mouse Adrenal Cortex. **International Gap Junction Conference** at Cancer Research Center of Hawaii at University of Hawaii, August 4-9, 2001.
  53. Prentice, N., Wynn, J.E., Davis, K.T., and **Murray, S.A.** Imaging and Time Lapse Visualization of Gap Junction Protein Trafficking. *A Research Odyssey, Science 2001 at the University of Pittsburgh*, Pittsburgh, PA, 2001.
  54. Prentice, N., Rucker, J., Davis, K.T., and **Murray, S.A.** Gap Junction Mobility in Connexin 43-GFP Transfected Cells as Assessed by Time Lapse Photography. **41<sup>st</sup> American Society for Cell Biology Annual Meeting** in Washington, D.C., December 8-12, 2001.
  55. **Murray, S.A.**, and Davis, K. Novel Tumor Markers in the Adrenal Gland. *State-of-the-Science Conference on The Management on the Clinically Inapparent Adrenal Mass ("Incidentaloma")* at **NIH** in Bethesda, MD, February 4-6, 2002.
  56. Wynn, J.E., Davis, K.T., Nickel, B.M., and **Murray, S.A.** Distribution of Connexin 43: A Model of Assembly and Degradation. **Synergy 2002**, University of Pittsburgh, 2002.
  57. **Murray, S.A.** An Assessment of Connexin 43-GFP Components in Living Cells: Alterations in Trafficking

- Following DbcAMP Treatment. **42<sup>nd</sup> American Society for Cell Biology Annual Meeting**, San Francisco, CA, 2002.
58. Rucker, J.J., and **Murray, S.A.** Connexin Protein Trafficking: Time Lapse Imaging of Connexin Endocytosis. **Annual Biomedical Research Conference for Minority Students (ABRCMS)**, New Orleans, LA, November, 2002.
  59. Davis, K.T., Gay, V.L., and **Murray, S.A.** An Assessment of Connexin 43-GFP Components in the Living Cell: Alterations in Trafficking Following DbcAMP Treatment. **42<sup>nd</sup> American Society for Cell Biology Annual Meeting** in Washington, D.C., December 8-12, 2002.
  60. Rucker, J.J., Nickel, B.M., Johnson, O.M., Boykins-Winrow, C., and **Murray, S.A.** Interactions Between Cytoplasmic Organelles and Gap Junctions. **43<sup>rd</sup> American Society for Cell Biology Annual Meeting** in San Francisco, CA, December 12-17, 2003.
  61. Johnson, O.M., and **Murray, S.A.** Ultrastructural and Time Lapse Demonstration of Annular Gap Junction Formation and the Subsequent Association with Cytoplasmic Structures. **Annual Biomedical Research Conference for Minority Students**, San Diego, CA., 2003.
  62. Nickel, B.M., Gay, V.L., and **Murray, S.A.** Fate of Gap Junction Plaques During Spontaneous Cell Separation. **International Gap Junction Meetings**, London, England, 2003.
  63. Nickel, B.M., Gay, V., and **Murray, S.A.** Dynamic Imaging of Gap Junction Events During Spontaneous Cell Separation, Local Traffic 2003: **Annual Pittsburgh Symposium on Intracellular Membrane/Protein Traffic**, Pittsburgh, PA 2003.
  64. Davis, K. McDuffy, I., Nickel, B., and **Murray, S.A.** Variations of Connexin 43 Distribution and Communication in Altered Adrenal Physiology. **The 44<sup>rd</sup> American Society for Cell Biology Annual Meeting** in San Francisco, CA, 2004.
  65. Nickel, B.M., and **Murray, S.A.** Differentiating Between Malignant and Benign Adrenal Tumors: Assessment of Connexin 43-GFP Distribution in Living Cells, **National Cancer Institute (NCI) Meeting**, Palm Springs, CA., 2004.
  66. Nickel, B. M., and **Murray, S.A.** Analysis of Gap Junction Protein Expression and Dynamics in Adrenal Cell Function, **International Endocrinology Meetings**, Lisbon Portugal 2004.
  67. Nickel, B. M., and **Murray, S.A.** Gap Junction Protein Dynamics and Adrenal Cell Function **Science 2004**, Pittsburgh, PA., 2004.
  68. **Murray, S.A.** Adrenocortical Gap Junctions and Steroidogenesis **85<sup>th</sup> Endocrine Society Meeting** in San Diego, CA., 2005.
  69. Achebe, B. H., Nickel, B. M., Sandulache, V., and **Murray, S.A.** Fate of Gap Junction Plaques During Cell Migration, **International Gap Junction Meeting** in Whistler, Canada, 2005.
  70. Chambers, L., Nickel, B.M., Achebe, B.H., Arain, Y., and **Murray, S.A.** The Role of Clathrin in Gap Junction Internalization. Presented at the **46<sup>th</sup> Annual American Society for Cell Biology Meeting**, San Diego, CA. December, 2006.

71. Nickel, B.M., Hewa Achebe, B., and **Murray, S.A.** Computer Animated Reconstruction of the Clathrin Endocytic Machinery Involved in Gap Junction Plaque Internalization. **International Gap Junction Meeting** in Denmark, 2007.
72. Nickel, B.M., DeFranco, B.H., and **Murray, S.A.** Microscopic Examination of Gap Junction Plaque “Endoexocytosis” in Adrenal Cells. **International Adrenal Meeting** in San Francisco, CA, 2008.
73. Nickel, B.M., DeFranco, B.H., and **Murray, S.A.** Assessment of clathrin-mediated annular gap junction formation as a marker of atypical adrenal cells. **International Gap Junction Meeting** in Brazil, Nov. 2008.
74. Ogunkoya, Y., Nickel, B.M., Gay, V.L., and **Murray, S.A.** The Association of Clathrin with Cellular Organelles Demonstrated by Quantum Dots Immuno-Electron Microscopy. **48<sup>th</sup> American Society for Cell Biology Annual Meeting** in San Francisco, CA, Dec. 2008.
75. DeFranco, B.H., Nickel, B.M., Gay, V.L., and **Murray, S.A.** Decreased Connexin 43 and Gap Junctional Communication alter Cell Migration. **48<sup>th</sup> American Society for Cell Biology Annual Meeting** in San Francisco, CA, Dec. 2008.
76. **Murray, S.A.**, Nickel, B.M., and Gay, V.L. Dynamic Imaging of the Life and Death of an Annular Gap Junction. **International Gap Junction Meeting**, Sedona, AZ, July 2009.
77. Buhari, H., **Murray, S.A.**, and Nickel, B.M.. Analysis of Gap Junction Plaque Internalization. **ABRCMS # 77 (Annual Biomedical Research Conference for Minority Students)**, Phoenix, AZ, Nov. 2009.
78. Nickel, B.M., and **Murray, S.A.** Connexin 43 Gap Junction Plaque Endoexocytosis. **American Society for Cell Biology 50th Annual Meeting** in San Diego, CA, Dec. 2009.
79. **Murray, S.A.**, Nickel, B.M., and Gay, V.L. ROLE OF DYNAMIN IN GAP JUNCTION PLAQUE ENDOCYTOSIS. **50th American Society for Cell Biology Annual Meeting** in Philadelphia, PA, Dec. 2010.
80. Nickel, B.M., Schneider, K.A., Boller, M., and **Murray, S.A.** Analysis of the Machinery Regulating Molecular Gap Junction Endoexocytosis. **International Gap Junction Meeting**, Ghent, Belgium, August 2011.
81. Boller, M., Schneider, K. Nickel, B., Shakespeare, T., and **Murray, S.A.** Ultrastructural and Live-Cell Analysis of Dynamin's Role in Gap Junction Plaque Endoexocytosis. **51<sup>th</sup> American Society for Cell Biology Annual Meeting** in Denver, CO, Dec. 2011.
82. Shakespeare, T.I., Nickel, B.M., O'Neil, S.J., Harper, J., and **Murray, S.A.** Analysis of Annular Gap Junction Vesicle Fission. **52<sup>nd</sup> American Society for Cell Biology Annual Meeting** in San Francisco, CA, Dec. 2012.
83. Christian, C.L., **Murray, S.A.**, and O'Neil, S.J. Tracking Gap Junction Protein: Monitoring The Fate of Annular Gap Junction Vesicles. **ABRCMS REF. # 77 (Annual Biomedical Research Conference for Minority Students)**, Nashville, TN. Nov. 2013.
84. Shakespeare, T.I., Nickel, B.M., O'Neil, S.J., and **Murray, S.A.** The Fate of Annular Gap Junction Vesicles. **53<sup>rd</sup> American Society for Cell Biology Annual Meeting** in New Orleans, LA, Dec. 2013.
85. Christian, C., O'Neil, S.J., Walker \*, W.H., and **Murray, S.A.** Regulation of GAP Junction Expression in Sertoli Cells by Src Kinase. **The Endocrine Society's 96th Annual Meeting**, ICE/ENDO, Chicago, IL, June 2014.

86. Velazquez, C.G., **Murray, S.A.**, Steed, M.M., and Bisher, M.E. Protein Kinases and the Regulation of Annular Gap Junction Vesicle Size. **ABRCMS (Annual Biomedical Research Conference for Minority Students)**, San Antonio, TX, Nov. 2014.

### PROFESSIONAL ACTIVITIES

#### Teaching:

1982-Present	Gross Anatomy to medical students (Human Body Block)
1988-1992	Course Director in Medical Gross Anatomy
1984	Transmission and Scanning electron microscopic techniques to Physician's Scientist Training Program - Department of Medicine
1984	Graduate Student Journal Club Series
1985-1987	Endocrinology lecture in Structure and Function of Human Tissue.
1985-1996	Cell Structure and Function- Cell-Cell Communication lectures-
1995-	Independent research-
1996-	Special Topics in Physiology -
1998-1999	Foundations of Biomedical Science
1998	Medical School, Integrated Case Studies. Facilitator
1999	Research Seminar (Journal Club)
1999-Present	Molecular Mechanisms of Tissue Growth and Differentiation

#### Postdoctoral Fellows and Graduate Student Committees:

Member of **Masters Thesis Committee** for Donna S. Hughes - 1982

Member of Ph.D. **Comprehensive Examination** and **Thesis Committees** for the following:

Harold E. Kennah, II -	1984	(Department of Anatomy)
Diana L. Bourke -	1983-1985	(Department of Anatomy)
Maria Moschella -	1985-1988	(Department of Neurobiology, Anatomy, and Cell Science)
Karen Hulkower -	1988-1990	(Department of Molecular Genetics and Biochemistry)
Duncan Stern -	1993-1996	(Department of Neurobiology)
Sheryl Ontell -	1987	(Department of Anatomy)
Keiko Ozaki -	1989-1990	(Department of Anatomy)
Elisa Konieczko -	1989-1990	(Department of Anatomy)
Shawn Stover -	1995-1996	(Department of Cell Biology and Physiology)
Connie Rogers-	1996	(Department of Cell Biology and Physiology)
Steve Smith-	1997	(Department of Cell Biology and Physiology)
Som-Ming Leung	2000-2005	(Department of Cell Biology and Physiology)
Vlad Sandulache	2004	(Dept. of Cellular and Molecular Pathology)
Ethan Block	2008- 2010	(Department of Cell Biology and Physiology)
Yang He	2005-2008	(School of Engineering)
Anupuma Jha	2007- 2009	(Dept. of Cellular and Physiology)
Paula Bernal	2006-2010	(Dept. of Cellular and Physiology)
Daniel Roh	2008-2011	(Dept. of Cellular and Physiology)
Emily Wickline-Boyde	2008-2011	(Interdisciplinary Biomedical Graduate Program)

### Human Resource Contributions.

Research opportunities in the laboratory have afforded projects for the training of undergraduates, medical students, graduate students, postdoctoral fellows, and high school students. My research has allowed the attraction of these qualified students most of whom have served as co-authors on abstracts or manuscript publications. Students have presented posters at national scientific meetings (Endocrinology and Cell Biology) and participated in international research collaborations in Woods Hole, MA., Lyon, France, and Siena Italy.

Advisor for the following graduate students:

Timothy Billiar	Ph.D. student -	1989-1991 - Chairman of Medicine studied nitric oxide mediated cGMP release.
Ugochi Oyoyo	M.D./Ph.D. student -	1992-1997 (Completed degree May 1997)-Thesis title- The role of connexin-43 gap junction expression in adrenal cortical cell function.
Camilia Dilliard	Ph.D. student -	1993-1995- studied the role of cytoskeletal elements in adrenal response
Uzma Shah Ph.D.	student -	1996-2001- studied the role of gap junctions expression in adrenal response
Deidre Gipson	M.D./Ph.D. student -	1997-1998- studied the role of gap junctions expression in adrenal response
Kevin Davis	Ph.D. student-	1998-2003- studied the role of gap junction expression in endocrine response
Christopher Herrem	Ph.D. student-	2000- Rotation in Lab. Studied role of gap junction expression in endocrine response
John Dubinion	Ph.D. student -	2000- Rotating in Lab.
Bado Hewa Achebe	Ph.D. student-	2003-2009 Studied the role of gap junctions in cell migration.

Advisor for the following medical students: (listing 13 of 35 students)

Derrick Tolbert Walker	1987	summer rotation
Michael Thomas	1987	summer rotation
Arnold Smalls	1988	summer rotation
Brockton Hefflen	1989	summer rotation-Marine Biological Laboratory
Zsolt Fargus	1989-91	Medical Student from Hungary.
James Smith	1991	summer rotation
Edward Leonard	1991-1994	Howard Hughes recipient - one year rotation Marine Biological Laboratory-summer 1991,1992. Bristol-Myers Squibb Company & Commonwealth Fund Rotation 1991-1992. National Medical Fellowship Recipient.
Stacey Simmons	1995	V. Heinz Scholar- one year rotation.
Clinton Jules	1995	summer rotation
Andrew Ibeauchi	2002	
Nefrititi Brown	2004	summer rotation
Vlad Sandulache	2004	summer rotation
Jacob Martinez	2005	summer rotation

Research Advisor for the following postdoctoral fellows:

Howard Plummer III	1990-1992-	Ph.D. Bowling Green State University
Starletta Williams-Jackson	1993-1996 -	Ph.D. Howard University, Washington D.C.



Shanthi K. Narayanan	1994-1996 - Ph.D. Indian Institute of Technology, Madras, India.
Juliet Wynn	2001-2007 – M.D.
Cheryl Bell	2014- -Ph.D. University of Connecticut

Research Advisor for the following undergraduate students: (listing 11 of 23 students who have participated in summer rotations as Center of Excellence, Jean Hamilton Fellow, Quest Student. Students presented research at the University of Pittsburgh Honors Colleges Science Fair)

William Dennis	Melisa Bennett	Kiara Hargrove	(Rotation in France-1995)
Janet Sherman	John Velcher	Lorraine Faulcon	(Rotation in France-1995)
Kirsta Suggs	Michael Bygrave	Blayre Britton	Tiffany Stubbs
Jasma Rucker (rotation in Italy, 2001)		Veronica Flake	(Rotation in Italy, 2001)

Research Advisor for the following undergraduate students Listing 14 out of 61:

Yassar Arain	2006 summer rotation
Nicole Blackman	2007 summer rotation
Octavia Brooks	2008 summer rotation
Halima Buhari	2009 summer rotation; undergraduate
Marie Boller	2010, 2011 summer rotation; undergraduate
Kimberly Schneider	2010, 2011 summer rotation; undergraduate
LaKeisha Francis	2011 summer rotation; undergraduate
Raven Johnson	2012 summer rotation; undergraduate
Jordan Harper	2012 summer rotation; undergraduate
Courtney Christian	2013-present
Kayvan Fallah	2013 summer rotation; undergraduate
Pearl Eni	2013 summer rotation; undergraduate
Christopher Velazquez	2014 summer rotation; undergraduate
Chidi Nwarpo	2015- Independent study

Research Advisor for the following high school students: (listing 5 of 16 students)

Sonobia Tobin- summer 1995, 96,1997	Charlene Allan summer- 1985
Larry Johnson- one year 1996-1997	Jean Knolls summer- 1983
Michele Robinson 1999-2001	

Research Advisor for the following students at the Marine Biology Laboratory, Woods Hole, MA.

Rosa Perez	1988 Undergraduate Hunter College.
Washington Hernandez	1989 Undergraduate Howard University
Dwight Berry	1989 Undergraduate Howard University.
Kevin Brewton	1989 Undergraduate Howard University

External Thesis Review Committee Member–Germany 2012  
 Institut für Biophysik, Leibniz Universität, Hannover Herrenhäuserstr, D-30419 Hannover

Research:  
Grant Support

RDF (Central Research Development Fund)  
 P.I. "The Effect of Tumor Promoting Agents on Gap Junction Structure"  
 January 1, 1983 - June 30, 1983

Faculty Development Teaching Development Grant  
P.I. "Uptake of Liposomes by Human Adrenal Cells in Culture"  
July 1, 1983 - June 30, 1984

RDF (Central Research Development Fund)  
P.I. "The Effect of Tumor Promoting Agents on Junction Structure and Cell Communication"  
renewal - July 1, 1983 - June 30, 1984

American Cancer Society Institutional Research Grant  
P.I. "Incidence of Gap Junctions and Rate of Cell Population Growth Following Exposure  
to a Tumor Promoter"  
January 1, 1983 - December 31, 1983

National Science Foundation  
P.I. "Localization of Activated cAMP-Dependent Protein Kinase"  
June 1, 1984 - December 31, 1989  
December, 1989 - 1992

National Science Foundation  
P.I. "The Role of cAMP-dependent Protein Kinase and Gap Junction Communication"  
July 1, 1993 - June 30, 1996

Sandoz Foundation for Gerontological Research  
P.I. "Capacity for Stress in Young and Old Hepatocytes"  
July 1, 1988 - June 30, 1989

NIH Biomedical Grant (RDF)  
Co-P.I. with Dr. Jerry McCauley "The Effects of Cyclosporine and Its Metabolites Upon Renal Epithelial Cell  
Proliferation"  
July 1, 1989 - May 31, 1991

National Science Foundation  
Co-P.I. "An Advanced Light Microscopy Facility" - Dept. of Biology  
September, 1990 - February, 1992

International Fellowship, John E. Fogarty International Center for Advanced Study, International Research Training  
Program Leadership Alliance- NIH, 1995-1996, Lyon, France, 1996-1997, Addis Ababa, Ethiopia.

National Science Foundation- \$210,000  
P.I. "The Role of cAMP-dependent Protein Kinase and Gap Junction Communication"  
July, 1996-July, 1999

National Science Foundation- \$13,751  
P.I. "The Role of cAMP-dependent Protein Kinase and Gap Junction Communication"  
Supplement  
July, 1997- July, 1999

Alfred P. Sloan Foundation- \$90,000  
P.I.  
1995-2000

Prostate and Urologic Cancer Center (PUCC) Pilot Project Program,  
University of Pittsburgh Cancer Institute- \$20,000  
P.I. “Modulation of gap junction expression and decreased prostate cell tumorigenesis”  
July 15, 1998-July 14, 1999

African American Postdoctoral Fellowship Award- \$32,500  
From the Provost’s office, University of Pittsburgh  
P.I. Award to support Post-Doc  
9/1/98-8/30/99

National Science Foundation - \$406,436  
P.I. Endocytic Machinery Involved in Gap Junction Plaque Internalization  
6/1/07 – 5/31/10

### Current Grant Support

National Science Foundation- P.I  
Role Gap Junction Plaque Internalization and Processing  
NSF #MCB10 23144  
12/1/10 – 11-30-2016  
Total Award: \$112,305.00

National Science Foundation- P.I.  
Molecular Cell Biology Division  
Cellular Dynamics and Function Program  
Investigation of the Regulation of Annular Gap Junction Processing, A Critical  
Modulator of Cell-Cell Communication  
MCB # 1408986  
7/1/14 – 6/30/17  
Total Award: \$234,116.00

National Institutes of Health- Co-PI  
The ASCB MAC Junior Faculty and Postdoctoral Fellows Career Development Workshop  
R13 (Cleveland)  
9/1/14 – 8/31/17  
Total Award: \$580,877.00

National Institutes of Health- Co-PI  
National Institute for Mentoring Early Minority Faculty in Neuroscience  
R25 (NS076414) (Torres)  
3/1/14 – 2/31/18  
Total Award: \$218,700.00

National Science Foundation –  
ROA Supplement – Investigation of the Regulation of Annular Gap Junction Processing, a Critical Modulator of Cell-  
Cell Communication, for Dr. T. Shakespeare  
06/1/15-6/30/16  
Total Award: \$25,000

Howard Hughes Medical Institute  
Support from Howard Hughes to American Society for Cell Biology Program  
for Visiting Professor , Dr. Mesia Steed (2014)  
Total Award: \$20,000

### Pending Grant Support

National Science Foundation

Presidential Awardee for Excellence in Science,  
Mathematics, and Engineering Mentoring (Submitted June 19, 2015)  
(Selection Pending)

Total Award: \$10,000

Seminars and Invited Lectureships

- 1981 Keynote Speaker - Science Career Conference, University of California, Riverside, CA.
- 1981 Department of Biology, Department of Biochemistry, Division of Biomedical Science, University of California, Riverside.
- 1982 Department of Zoology, University of Tennessee, Knoxville, Tennessee.
- 1983 Department of Biology, The dynamic states in the evolution of biological sciences symposium. Texas Southern University, Houston, Texas.
- 1984 Department of Anatomy, University of Indiana, Bloomington, Indiana.
- 1984 Ribosome Club - Department of Biochemistry, University of Pittsburgh, Pittsburgh, Pennsylvania.
- 1984 Pharmacology Journal Club - Department of Pharmacology, University of Pittsburgh, Pittsburgh, Pennsylvania.
- 1984 Anatomy Graduate Seminar - Department of Anatomy and Cell Biology, University of Pittsburgh, Pittsburgh, Pennsylvania.
- 1984, 1985 School of Urban and Public Affairs, Carnegie-Mellon University, Pittsburgh, PA  
Minority Biomedical Research Symposium.
- 1985 13th Annual MBRS Symposium sponsored by NIH, Division of Research Resources, Miami, Florida.
- 1985 Department of Anatomy, Temple University, Philadelphia, Pennsylvania.
- 1986 Department of Biology, Atlanta University, Atlanta Georgia.
- 1986 Cellular and Molecular Biology Program, Department of Microbiology and The Cancer Center, Howard University, Washington, D.C.
- 1986, 1988 Invited Conference participant - Black Biomedical Scientist Conference. The University of Michigan, Ann Arbor, Michigan, 1986. Yale University, New Haven, Connecticut, 1988.
- 1986, 1987 Rutgers University, Newark, New Jersey.
- 1984, 1987 Division of Research Initiation and Improvement - National Science Foundation Meeting, Washington, D.C.

1987, 1988 Department of Anatomy, Howard University, Washington, D.C.

1988 Department of Anatomy, University of Kentucky, Lexington, Kentucky.

1989 American Society for Biochemistry and Molecular Biology and the American Society for Cell Biology joint meetings - Symposia speaker, San Francisco, California.

1989 American Society for Biochemistry and Molecular Biology - Committee on equal opportunities, San Francisco, California.

1990 Florida A & M University, Tallahassee, Florida.

1993 Carnegie Mellon and University of Pittsburgh Career Conference Keynote Speaker, Pittsburgh, Pennsylvania.

1994 Minority Education and Professional Development Conference - University of Pittsburgh, Pittsburgh, Pennsylvania.

1996 Morehouse School of Medicine, Department of Biochemistry, Atlanta University, Atlanta, Georgia.

1996 Meharry Medical College, 15<sup>th</sup> D.T. Rolfe Scholars Lecture, Nashville, Tenn.

1996 Stanford University, Stanford, California.

1996 American Society of Cell Biology Meeting - Gap Junction Communication Symposia San Francisco, California.

1996 Epithelium Club, Department of Cell Biology and Physiology, University of Pittsburgh, School of Medicine.

1996 Departmental Seminar Series, Department of Cell Biology and Physiology, University of Pittsburgh, School of Medicine.

1997 Department of Biology, Howard University, Washington, D.C.

1997 Prostate and Urologic Cancer Center, University of Pittsburgh Cancer Institute

1998 Department of Biology, Clark Atlanta University, Atlanta, Georgia.

1998 Department of Biology, Texas Southern University, Houston, Texas.

1998 Woman in Cell Biology Education Committee Sponsored Lunch Career Options and Issues Facing Cell Biologists. San Francisco, December.

1998 Greater Pittsburgh Woman's Empowerment Benefit

1999 Spelman College, Atlanta, Georgia

1999 California State University - Northridge

- California State University - Dominguez Hills, Los Angeles, California.
- 2001 The American Society for Cell Biology 41<sup>st</sup> Annual Meeting  
Washington, D.C.
- 2001 “Imaging of Gap Junction Protein Trafficking.” American Society for Cell Biology – Gap Junction  
Subgroup Meeting, December, 2001.
- 2002 Research and Motivational Talks, Southern University, Baton Rouge, LA  
(Endocrine Society)
- 2002 Research and Motivational Talks, California State University, (Dominguez Hills)
- 2002 Workshop Presentation at the Annual Biomedical Research Conference for Minority Students, New  
Orleans, LA.
- 2003 “Promoting Interdisciplinary Approaches to Global Issues in Science.” The Eight Annual Life and  
Physical Sciences Research Symposium at North Carolina Agricultural and Technical State  
University, Greensboro, NC.
- 2003 “The Impact of Connexin Trafficking on Adrenal Cell Function.” The Eight Annual Life and  
Physical Sciences Research Symposium at North Carolina Agricultural and Technical State  
University, Greensboro, NC.
- 2003 Workshop Presentation at the Annual Biomedical Research Conference for Minority Students, San  
Diego, CA.
- 2004 Keynote Speaker at Graduate School of Biomedical Sciences at Rutgers University.
- 2004 American Society for Cell Biology EE Just Lecture
- 2005 Endocrine Meeting, San Diego, CA.
- 2011 University of California Dominguez Hills, Carson California  
  
Annual Biomedical Conference for Minority Students, Charlotte, North Carolina
- 2010 The American Society for Cell Biology, 50th Annual Meeting Philadelphia, PA.
- 2011 American Society for Cell Biology Meeting, Denver, Co.
- 2012 Scientific Boot Camp at Savannah State University
- 2005-Current Organizer and Speaker-Junior Faculty and Post Doc Workshop, Sponsored by the American  
Society for Cell Biology, Funded by the NIH (San Juan, Puerto Rico, June 2014, Houston,  
Texas, July 2015).
- 2015 Speaker- Faculty Research and Education Development (FRED) Program, Funded by the NSF (San  
Juan, Puerto Rico, 2014, Houston, Texas, 2015.

- 2014- Discussion Leader- American Society for Cell Biology Meeting, Table Topic, Endoexocytosis, Philadelphia, PA.
- 2014 Session Chair- International Adrenal Conference (Receptors and Signaling Session), Charleston, NC
- 2014 Presented at the Joint Meeting of the International Congress of Endocrinology and the Endocrine Society, ICE/ENDO 2014 (Regulation of GAP Junction Expression in Sertoli Cells by SRC Kinase) (Chicago, IL, June 2014).
- 2015 Invited Speaker- Albany State University, Albany, GA. April 2015.
- 2015 Presenter International Gap Junction Meeting, Valparaiso, Chile 2015.

### International Lectures

- 1983 School of Medicine, University of Lagos, Lagos, Nigeria, West Africa.
- 1984 International Symposia on Intercellular Junctions, Japanese National Institute of Physiological Science, Okazaki, Japan.
- 1990 VI International Congress on Spermatology - Centro per lo Studio della Cellule Germinali del CNR - Sienna, Italy.
- 1990 Fourth International Conference on the Adrenal Cortex - Emory University, Atlanta, Georgia.
- 1993 International Symposia on Intercellular Junctions, Hiroshima, Japan.
- 1994 Sixth International Conference on the Adrenal Cortex - Ardmore, Oklahoma.
- 1995 International Gap Junction Conference, The Role of Connexin Diversity, L'Ile des Embiez, France.
- 1998 Impact of Biotechnology on Cancer Prediction, Prevention and Treatment, Nice France, Oct. 24-28.
- 1999 Cell Adhesion and Communication in Growth Control and Cancer Meeting in Lyon, France, Jan. 15-23, 1999.
- 2000 Adrenal 2000 Conference, Toronto, Canada June 16-18, 2000
- 2001 American Society for Cell Biology, Gap Junction Symposium, Washington, D.C., Dec. 2001.
- 2003 International Gap Junction Meetings, Fate of Gap Junction Plaques During Spontaneous Cell Separation. London, England.
- 2004 International Congress of Endocrinology, Adrenal Cell Communication, Lisbon, Portugal.
- 2005 International Gap Junction Meeting, Whistler, British Columbia, Canada.

- 2011 International Gap Junction Meeting, Ghent, Belgium, August 2011.
- 2014 Session Chair- International Adrenal Conference (Receptors and Signaling Session), Charleston, NC
- 2015 Presenter International Gap Junction Meeting, Valparaiso, Chile 2015.

Visiting Scientist to Minority Institutions

These lectures were sponsored by the Federation of American Societies for Experimental Biology (FASEB) funded by the National Institute of General Medical Science (NIGMS) NIH.

- 1986 Florida International University, Miami, Florida  
Morgan State University, Baltimore, MD.
- 1989 Texas Southern University, Houston, Texas  
Spelman College, Atlanta, Georgia
- 1994 Selma University, Selma Georgia

Other Research Related Activities

- 1986-1990 Summer Research Scholar at Marine Biological Laboratory (Woods Hole, Massachusetts) funded by American Society for Cell Biology with support from the National Institute of Health.
- 1988 Chairman of the International Science Fair Awards Committee of the National Society for In Vitro Biology.
- 1988 Member of the Committee to Develop Specifications for the New Graduate Record Examination (GRE). Subject test on Cell/Molecular Biology and Biochemistry - Educational Testing Service, Princeton, New Jersey.
- 1990 Co-Organizer and Invited Speaker - Careers in Biological Sciences -Airlie House Conference Center, Airlie, Virginia (sponsored by the American Society for Cell Biology).
- 1983 Journal Referee for Hearing Research.
- 1984 Journal Referee for Science.
- 1990 Journal Referee for Trends in Biology.
- 1993 Journal Referee for Journal of Cell Biology.
- 1994-Present Research Advisory Committee - Morehouse School of Medicine.



1997 Journal Referee for Experimental Cell Research.

1999 Journal Referee for The Journal of Histochemistry and Cytochemistry

2001 Journal Reviewer for Molecular and Cellular Biochemistry

2004 Journal Reviewer for Molecular and Cellular Biochemistry

2004 Journal Reviewer for Journal of Cell Biology

2004 Journal Reviewer for Urology

2008 Co-Chairman of Session on Receptors and Signal Transduction, International Adrenal Conference

2011 Journal Reviewer for Molecular and Cellular Biochemistry

2011 Journal Reviewer for Molecular Endocrinology

Special Appointments, Study Sections, Site Visit Teams, Panel Memberships (etc.)

1999-2002 Council Member, American Society for Cell Biology

2010 NSF study section MCB

2015 Serve on the Organelle Biogenesis and Trafficking 2015 Panel, which was held at the National Science Foundation.

2000-2005 Advisory Board Member – Annual Biomedical Research Conference (ABRCMS)

2010 Advisory Committee Norfolk State University- Center for Biotechnology and Biomedical Sciences

2011 International Gap Junction Meeting, (Panal Chair) Ghent, Belgium

2014, 2015 Mentor - NIH-R25 Functional and Applied Genomics of Blood Disorders program at the Georgia Regents University – (Dr. Betty Pace-Program Director, Dr. Juan E. González – Co-Program Director) Programs to Increase Diversity Among Individuals Engaged in Health-Related I – Mentor for Dr. Teresa Shakespeare 2014 and Dr. Ghislaine Mayer 2015

2015 Advisory Board for pending, NIH-R25 Vascular Medicine and Cell Biology Research A – (Ofori-Acquah & Paula Davis) (Advisory Board) Pittsburgh Undergraduate Research Diversity Program (PURDIP) 6/1/16-8/31/20

2015 Member of Scientific Advisory Committee for the International Gap Junction Society Meeting, Valparaiso, Chili 2015.

National Institute of Health (NIH)

1987 - 1991 Member of National Institute of Health, NIH (MBRS) Study Section.  
Member of NIH Site Visit Team

- 1988 Universidad Central Del Caribe Cayay, Puerto Rico.
- 1988 Interamerican University San Juan, Puerto Rico.
- 1988 Atlanta University, Atlanta, Georgia.
- 1989 California State University - Domiguez Hills, Los Angeles, California.
- 1989 St. Mount Mary College, Los Angeles, California.
- 1991 University of California San Diego, San Diego, California.
- 1988 Representative at the National Advisory Research Resources Council/NARRC of NIH for the Minority Biomedical Research Support subcommittee of the General Research Support Review.
- 1992-96 Member, NIH Division of Research Grants Study Section (Physiological Chemistry).
- 2003 Member, NIH CSR – F31 Minorities Fellowships Study Section (ZRG1 F05 (29) L)

National Science Foundation (NSF)

- 1984 National Science Foundation Conference for Research Improvement in Minority Institutions (RIMI) and Minority Research Initiation (MRI).
- 1987 Panel discussion member - National Science Foundation 1987 MRI Principal Investigator's Meeting.
- 1990 Member of NSF Panel on Women in Science - Washington, DC.
- 1990 Member of NSF Site Visit Team - Meharry School of Medicine, Nashville, Tennessee.
- 1993 Member of Committee of Visitors for the NATO Program.
- 1991, 1994, 1997 Member of Committee of Visitors for the Cell Biology Program – National Science Foundation.
- 1999 Member of NSF Panel –Funding for Minority Science Meeting- Atlanta GA.
- 2000 Chair of Members of Visitors- National Science Foundation

Service:

University and Medical School

- 1983 Member of the School of Medicine Nominating Committee for the Evaluation of the Dean of the Medical School.
- 1983 Member of the University of Pittsburgh Graduate and Professional Education of the Physician Committee (GPEP) and Workshop.

1983-Present School of Medicine Summer "Minority" Work-Study Program.

1983-1991 Member of First Year Retention Committee.

1984-Present Member of Medical Student Promotions Committee.

1985 Member of Committee to Revise Medical Student Promotions Guidelines.

1985-1986 Member of the Committee to select the Dean of the School of Medicine.

1986-1987 Member of the Committee to select the Chairman of the Physiology Department.

1986 Member of the Student Faculty Relations Committee.

1987 Member of the faculty meeting with the AAMC Site Visit Team Research Project on the graduation rate of under represented minority students - April 23, 1987.

1988 Member of Student Financial Aid Committee.

1989 Member of Ad Hoc Tenure Committee.

1989-1992 Curriculum Review Committee.

1994 Internal Review Committee for the evaluation of the academic programs in the Department of Human Genetics.

1992-Present Advisory Committee - Child Health Research Center Grant.

1993 Faculty Liaison Committee for the School of Medicine's Health Careers Opportunity Program.

1993-Present Member Pittsburgh Cancer Institute.

1994-Present Medical School Representative Senior Woman Faculty Group.

1994-Present NIMH Training Grant Faculty Member - Advisory Committee.

1995-1996 Search Committee Assistant Dean for Student Affairs.

1995-Present Cell Biology & Physiology Promotions Committee.

1995-1998 Chairman and Organizer of Symposium ASCB-Woods Hole.

1996-Present University of Pittsburgh Helen Faison Council of Elders.

1996-Present Member of the Training Faculty Immunology Graduate Training Program.

1996-Present Member of the Training Faculty Cell Biology and Physiology.

1997-Present University of Pittsburgh M.D./Ph.D. Selection Committee Member.

1997-Present University of Pittsburgh Commencement and Honors Convocation Speaker Selection

1997-Present University of Pittsburgh Provost's Development Fund Review Committee

1998 Judge for the Afro Academic Cultural Technological and Scientific Olympics competition, Atlanta, Georgia, July 10-13

1998 NASA Judge for the 1998 ACT-SO science fair, Atlanta, Georgia, July 10-13

1998-Present Search Committee for the Senior Vice Chancellor/Dean of the School of Medicine, Equipoise Representative, University of Pittsburgh

1998-Present Advisory Board Member for Survival Skills and Ethics Program

1999-Present Standing Committee for Tenured Faculty Promotions and Appointments

Postdoctoral Fellows Taskforce for School of Medicine

1999 Search Committee for the Vice Provost and Dean of Students

1999-2010 Cell Biology Academic Affairs Committee

1999-2010 Cell Biology Financial Affairs Committee

1999-Present Cell Biology Promotions Committee

1999-2010 Cell Biology Recruitment Committee

1999-2010 Cell Biology Chairman's Advisory Committee

1999 Provost Committee on Diversity

2001 Member of the Community Research Advisory Board (CRAB), which will assist the Center for Minority Health (CMH)

2003 Honor Council Hearing Board Member

2004 African American Trailblazers Television Appearance  
 Panel Member on KDKA TV, Pittsburgh, PA.  
 SOM Summer Premedical Academic Enrichment Research Program (SPAEP)  
 SOM Student Promotions Committee (alternate member)  
 Transform-Science Advisory Committee- Maximizing Student Development (IMSD) Program Proposal  
 The Liaison Committee on Medical Education (LCME) the nationally recognized accrediting authority for medical education programs /SOM Accreditation Committees/Committees meet and wrote reports in 2010 but final visit of the LCME was in 2011

Self-Study Task Force (SSTF) (committee member)

Faculty Research (committee chair)

Liaisons

Student Research (committee member)

2007-Present Co-Chair of the Research Center of Excellence Committee, Graduate School of Public Health, University of Pittsburgh

Graduate School of Public Health Community Engagement Research Core

Graduate School of Public Health Research Advisory Committee- Center for Minority Health

Provost Special Advisory Committee

Provost Selection Committee for the Provost Development Fund Awards

University Community Representative for Equipoise

Junior Faculty Advancement – Panel Member