BIOGRAPHICAL SKETCH

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NAME: Debra Page Baluch

eRA COMMONS USER NAME (credential, e.g., agency login): dpbaluch

POSITION TITLE: Associate Research Scientist/Academic Professional

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Colorado at Colorado Springs	BA	05/99	Biology/Biochemistry
Arizona State University, Tempe Az	PhD	12/07	Cellular and Developmental Biology
Arizona State University, Tempe Az, Postdoctoral		12/11	Neurobiology

A. Personal Statement

At Arizona State University in the School of Life Sciences I have managed the W. M. Keck Bioimaging Laboratory for over 10 years and have been a user of the facility since its origination in 1997. This multi-user facility is equipped with various bioimaging instruments and provides services to over 150 research labs throughout the university and Phoenix metro/Arizona state region. During the past 18 years I have received extensive training in the use of various bright field, fluorescent, confocal, light sheet, multi-photon, TIRF, atomic force and TEM/SEM electron microscope systems as well as training in the vast methodology involved in fixed and live cell imaging. In an effort to continue my training, I also participate in annual professional society conferences to present data and either assist or participate in advanced imaging courses within the United States and Europe. In addition to managing the core lab facility, I teach two courses annually, Cell Biotechnology and Bioimaging, which instruct graduate and upper level undergraduate students in the use, maintenance and preparation of various cell cultures for image acquisition and analysis. My research utilizes various biochemical, molecular and fixed and/or live cell imaging approaches.

B. Positions and Honors

Academic/Professional Appointments

2012-current WM Keck Lab Manager and Associate Research Scientist, ASU
2008-current Faculty at Arizona State University
2013-current Co-Founder and CEO of TactilEyes (non-profit organization providing 3D tactile images to promote STEM education in the BVI community)
2008-2012 WM Keck Lab Manager and Assistant Research Scientist, ASU
2007-2008 Adjunct Faculty at Mesa Community College
2004-2006 Interim WM Keck Lab Manager at Arizona State University

Other Experience and Professional Memberships

2004-current Member of the Society for Developmental Biology [SDB]
2004-current Member of the Microscopy Society of America [MSA]
2008-current Member of the Society for Neuroscience [SfN]
2008 Cold Spring Harbor Course Teaching Assistant: Imaging Structure & Function in the Nervous System, Long Island, NY
2008-2009 Postdoctoral training, Arizona State University, Tempe, AZ, School of Life Sciences (Advisor: William Tyler) Project: The rapid modulation of presynaptic neurotransmitter release and synaptic vesicle recycling at hippocampal excitatory synapses by estradiol.
2009 EMBO Live Cell Imaging course at the Institute Gulbenkian de Ciencia, Portugal
2010 Cold Spring Harbor Course: Immunocyctochemistry, In Situ Hybridization, Super-Resolution & Live Cell Imaging, Long Island, NY
2009-2011 Postdoctoral training, Arizona State University, Tempe, Az, School of Life Sciences (Advisor: Richard Herman) Project: Develop image processing software to quantify small sensory nerve fibers as a pre-diabetic diagnostic tool and device development for spinal cord stimulation to modulate pancreatic function.
2011 BACs, TRAPs, and Targeted Mutations: Revealing Secrets of the Mammalian Brain Using Advanced Genetic Approaches, SfN Course
2012 MRI and Advanced Imaging in Animals and Humans, SfN course
2013 Chemo and Optigenetics: Light and chemical control of neurons, SfN course
2011-2016 Association for Women in Science (AWIS AZ Chapter) President [awis-caz.org]
2011-2015 National Association for Women in Science Executive Chapter Committee Member (AWIS.org) – General member since 2006
2010-2015 Columnist for the Association of Women in Science Magazine
FY10,12,14,17 Arizona Imaging and Microanalysis Society President and annual conference coordinator (azmicroscopy.org) [AIMS]
2017-current Member of the Society for the Study of Reproduction (SSR)
2012-2018 American Society for Cell Biology Women in Cell Biology (WICB) Executive Committee (ascb.org) Career and Mentorship Roundtable Session Chair (ASCB member since 2004)

Awards and Honors

2002 ASU School of Life Sciences Outstanding Teaching Associate Award
2003 AIMS (Arizona Imaging and Microanalysis Society) Best Poster Award
2008 Olympus Bioscapes Bioimaging Contest: 2 Honorable Mentions
2011 ASU Commission on the Status of Women's 2011 Outstanding Contribution and Achievement Award
2013 Nominee award for the Excellence in Diversity by the Committee for Campus Inclusion

C. Contribution to Science

1. In my current research project, I study an alternative modulator of smooth muscle activity called tyramine, which is a monoamine, produced in the catecholamine biosynthesis pathway. During catecholamine biosynthesis, dopamine, tyramine, octopamine, and norepinephrine are all derived from the tyrosine precursor. Tyramine is known to be associated with peripheral vasoconstriction, increased cardiac output, increased respiration, elevated blood glucose and release of norepinephrine. This research has found tyramine and its specific receptor TAAR1 to be localized at the surface of uterine muscle and precedes muscular contraction. My research group uses various techniques in addition to routine immunohistochemistry of frozen or paraffin embedded sections, such as force transduction, HPLC, Mass Spectrometry and live tissue imaging to uncover the role of tyramine in the mouse uterus.

a) Obayomi, S.M.B., Peck, S. and Baluch, D.P. (2017). Imaging Live Uterine Tissue Modulation Using Confocal Microscopy. Microscopy and Microanalysis. In Press.
b) Obayomi, S.M.B. and Baluch, D.P. (2017). Role of Tyramine in the Mouse Uterine Horn. In preparation
c) Obayomi, S.M.B. and Baluch, D.P. (2017). Live Tissue Imaging of Neuromodulation in the Mouse Uterine Horn. In preparation.
d) Obayomi, S.M.B, Agre, M. and Baluch, D.P (2016). The Role of Tyramine in the Mouse Uterine Neuromuscular Junction. Neuroscience 523.3/F12, 2016 Abstracts. Chicago, IL, Society for Neuroscience, Online.

2. My career focus has always involved the cytoskeleton and how it is used by the cells as a scaffold to orchestrate spatial and temporal signaling mechanisms. My early research projects were focused on signaling mechanisms that form and maintain spindle stability during meiosis and mitosis in the mouse model. These studies identified the spindle as a scaffold for signaling pathways that are required for meiotic resumption. During my postdoctoral training I continued to study cytoskeletal elements but instead of those involved in cell division I looked at those involved in synaptic vesicle trafficking to create a rapid response signaling mechanism involving estrogen. In a similar collaborative project, I worked with a colleague who also studies microtubule dynamics and was interested in glucose transporter recruitment to the membranes of myotubes during insulin stimulation. This project required live cell observation of membrane ruffle formation using DIC in order to specifically identify and image the signaling elements directly involved.

a) Baluch, D. P., Koeneman, B. A., Hatch, K., McGaughey, R. Capco, D. G. (2004). PKC isotypes in post-activated and fertilized mouse eggs: association with the meiotic spindle. Dev Biol 274: 45-55. PMID: 15355787
b) Baluch, D. P. and Capco, D. G. (2008). GSK3β Mediates Acentromeric Spindle Stabilization by Activated PKCζ. Dev. Biol. 17(1): 46-58. PMID: 18353303
c) Baluch, D.P., Georges, J., Deviche, P. and Tyler, W.M. (2009). Estrogen acts through GPR-30 Receptors to Rapidly Increase neurotransmitter release from hippocampal excitatory synapses. Neuroscience 523.3/F12, 2009 Abstracts. Chicago, IL, Society for Neuroscience, Online.
d) Langlais, P., Dillon, J.L., Mengos, A., Baluch, D.P., Ardebili, R., Miranda, D.N., Xie, X., Heckmann, B.L., Liu, J., and Mandarino, L.J. (2012). Identification of a Role for CLASP2 in Insulin Action. J. Biol. Chem, 287 (46): 39245-53. PMID: 22992739

3. For many years I have participated in collaborative research which investigated methods to improve the deconvolution of confocal images and to clearly discern cytoskeletal elements and possible scaffolding networks. One of my earlier projects involved the application of different deconvolution techniques, such as the crest point or Weibull algorithms, to confocal images to identify point source data and patterns generated by cytoskeletal networks. These analyses were applied to meiotic metaphase II mouse egg images and showed one of the first indications of a tubulin based scaffolding matrix that existed within the egg. In a later postdoctoral project I worked with a group to develop an algorithm that could identify continuous line data such as small sensory nerve fibers (SSNFs) found within the skin. Through the course of diabetic neuropathy there is a gradual decline in the number and length of SSNFs so this is a diagnostic tool used by physicians to evaluate patients but the findings are not consistent because of the bias due to patient history or physical shape. The focus of this project was to create a system that could quantify the length and number of SSNFs within a skin sample as an unbiased method to diagnose individuals who were pre-diabetic.

a) Baluch, D. P., Capco, D. G. (2002*).* Cellular Scaffolds in Mammalian Eggs. Frontiers in Bioscience 7: d1653-1661. PMID: 12086913
b) Jiuxiang Hu; Razdan, A.; Nielson, G.M.; Farin, G.E.; Baluch, D.P.; Capco, D.G. (2003). Volumetric segmentation using Weibull E-SD fields. IEEE TVCG 9 (3): 320-328. PMID: 1207440

c) Huang, A., Nielson, G., Razdan, A., Farin, G., Capco, D., and Baluch, D.P. (2006). Thin Structure Segmentation and Visualization in Three-Dimensional Biomedical Images: A Shape-Based Approach. IEEE TVCG 12 (1): 93-102. PMID: 16382611
d) Tamura, K., Mager, V. A., Burnett, L. A., Olson, J. H., Brower, J. B., Casano, A. R., Baluch, D. P., Targovnik, J. H., Windhorst, R. A., Herman, R. M. (2010). Semi-automated method of analysis of small sensory nerve fibers in human skin-biopsies. J Neurosci Methods, 185, pp 325-337. PMID: 19852982

4. The courses I teach are always enriched with microscopy based techniques because studying cellular behavior is a very visual science. A few years ago I had the pleasure to have a blind student take one of my classes. She was a straight-A student, pursuing a degree in molecular biosciences, who was determined and enthusiastic and very interested to know how cells looked through a microscope. It occurred to me that what we see in fluorescent microscopy is a relationship of signal intensity correlated to concentration and just like a graph, an image could be raised in height to represent changes in intensity. We formed an interdisciplinary team of scientists and came up with various ways to create 3D tactile images and have shared these images at many conferences and continue to work with non-profit organizations to host STEM workshops and summer camps for the blind and visually impaired.

a) Patent WO 2014081808 A1 (2012): Responsive Dynamic Three-Dimensional Tactile Display using Hydrogel
b) Williams, G.J., Zhang, T., Alexander, L., Gonzales, A., Baluch, D.P., Duerstock, B.S. (2014). 3D Printing Tactile Graphics: Application to Histology. RESNA Online [http://www.resna.org/sites/default/files/conference/2014/Other/Williams.html].
c) Hasper, E., Windhorst, R. A., Hedgpeth, H., Harris, L., Gonzales, A., Yu, H. and Farkas, Z. Baluch, D. P. (2015) Methods for Creating and Evaluating 3D Tactile Images to Teach STEM Courses to Visually Impaired and Blind Students. J. of Science Teacher Education, 44 (6), pp 92-99.

D. Research Support

Ongoing Research Support

1S10OD023691-01 NIH Baluch (PI) 2/1/17-1/31/18
Leica TCS SP8 Laser Scanning Confocal Microscope
This proposal requested funds to acquire a Leica SP8 inverted LSCM with a stage top incubation chamber, tandem scanner and sensitive GaAsP detectors enabling our primary NIH funded researchers to not only obtain their fixed cell images but to more easily incorporate live cell imaging of their samples as described in their research summaries.

RTS Equipment Reinvestment Baluch (PI) 2011-2018
Each year, beginning in 2011, the College for Letters of Arts and Sciences at ASU evaluates the remaining budget and sets aside money that can be used to update or extend the core lab resources. This is a competitive mechanism and through this funding opportunity, I have acquired new instrumentation for the lab such as; replacement computers, filter cubes, cameras, accessory microscope and lab equipment as well as an EVOL FL live cell-imaging microscope and KODAK In-Vivo small animal imaging system.

AIMS Conference Vendor Support Baluch (PI) 2010-2017
Arizona Imaging and Microanalysis Society (azmicroscopy.org), affiliate of the Microscopy Society of America, hosts an annual conference to bring together microscopy experts within Arizona to network, collaborate and learn from invited speakers that are recognized experts in the field. The conference includes a student poster session and awards. Every other year the conference is held at ASU. During those years I am the president of

the society and organize the event. Funding support comes from vendor sponsorship, society grants and ASU department funds.

Ugly Bug Contest Baluch, Kazilek (Co-PIs) 2009-2017
The Ugly Bug Contest is an annual event where insects are collected and imaged using a SEM then colorized and used to create posters, worksheets and coloring sheet activities for students K-8. The purpose of the contest is to capture young student's interest and use the opportunity to educate them in science and how to use microscopes. The contest is featured on the Ask a Biologist website (https://askabiologist.asu.edu/activities/ubc2015) and the posters and educational materials are distributed to local teachers, attendees to various science festivals in Arizona and at the Arizona Science Museum. Funds to support this event comes from the USDA, AIMS and ASU donations.

Completed Research Support

3D IMAGINE/OKED Seed Fund Baluch, Windhorst (Co-PIs) 2012-2013
Project to create pilot courses of Astronomy 113 and BIO100 that introduce images converted into a 3D tactile format to test the improvement in participation and performance of visually impaired students. These resources continue to be made available to students requiring this assistance.