

SUMIT BHATTACHARYA Ph.D

Senior Research Associate

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Education:

2001- 2004: B.S. in Biotechnology, Bangalore University, India

2004- 2006: M.S. in Biotechnology, Bangalore University, India

2007- 2012: Ph.D. in Biomedical Sciences (Track- Neuroscience and Neurological Disorders)

2013- 2014 Schepens Postdoctoral Fellow, Schepens Eye Research Institute

Massachusetts Eye & Ear Infirmary, Dept. of Ophthalmology, HMS, USA

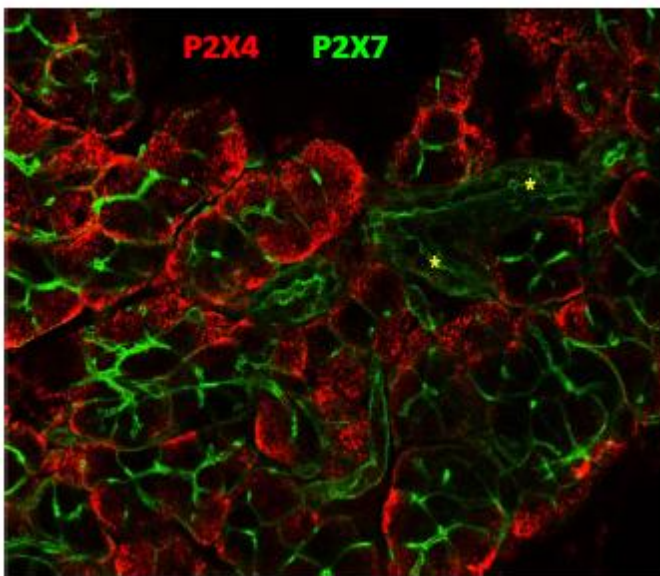
2014 Senior Research Associate, Dept. of Neurosciences, UTMC, USA

Research Interests:

My research interest is primarily directed towards understanding neural regulation of exocrine glands by modulation of Calcium signals in normal and diseased animal models. In case of autoimmune disorders like Sjögren's syndrome, both the salivary as well as the lacrimal glands are affected. This in turn leads to xerostomia (dry mouth) and xerophthalmia (dry eye). My Ph.D dissertation in Giovannucci laboratory was based on determining nontraditional Ca²⁺ signaling pathways for salivary regulation in mice models. This work demonstrated purinergic receptors as a primary candidate in evoking protein secretion in the absence of a cholinergic and adrenergic contribution in parotid glands. Additionally, my work also identified P2X₄R as a potential molecular target to

enhance protein secretion in salivary hypofunction patients. My postdoctoral research goal in Dartt laboratory was mainly focused on understanding the molecular interplay between Calcium signaling cascades during xerophthalmia. Previous findings from the lab have successfully demonstrated lacrimal gland dysfunction during progression of chronic dry eye. I characterized the female TSP-1^{-/-} mouse, an animal model for Aqueous Deficiency Dry Eye (ADDE). TSP-1^{-/-} mouse has been shown to mimic human dry eye progression and development. My findings suggest that the TSP-1^{-/-} mouse model after multiple hits developed dry eye disease. Alterations in neural innervations, calcium signaling and protein secretion suggested that glandular dysfunction precedes cellular inflammation in our model.

Thus, based on my research interest and previous experience, I am well poised to investigate the interaction between intracellular Calcium signaling pathways in exocrine glands and how these pathways are altered in a disease model like Sjögren's syndrome. With my knowledge in exocrine biology and experience in live cell Calcium imaging, confocal microscopy and molecular biology, our laboratory is well poised for undertaking such a research goal.



Confocal Microscopy of a parotid gland section stained with P2X4R (red) and P2X7R (green) specific antibodies. P2X4R is located in the basal region while P2X7R is located in the apical and lateral spaces in acinar cells in the parotid gland.

Honors and Prizes

June 2014 Invited poster at the Poster presentation at Harvard Medical School,
Department of Ophthalmology Annual Meeting, Boston, Massachusetts.
Poster Title: "Alteration in Cell Structure and Function in Lacrimal Gland

of Thrombospondin-1^{-/-} Mouse Model of Sjögren's Syndrome"

**Winner in the basic science category of the 2014 Harvard Medical School,
Department of Ophthalmology Trainee Poster Contest**

**Feb 2014 Invited poster at the Gordon Research Conference in Ventura, California
Poster Title: "Alteration in Cell Structure and Function in Lacrimal Gland
of Thrombospondin-1^{-/-} Mouse Model of Sjögren's Syndrome"**

**July 2012 Invited talk at the Microscopy and Microanalysis Meeting in Phoenix, AZ
Talk title: "Spatiotemporal Properties of Purinergic-evoked Calcium
Signals And Exocytosis in murine Parotid acinar cells"
Recipient of Travel Award from University of Toledo College of Medicine**

**Feb 2011 Invited talk at the Gordon Research Conference in Galveston, Texas
Talk Title: "Differential effects of P2X₄ and P2X₇ receptor activations
on Ca²⁺ signaling and exocytosis in mouse parotid acinar cells"
Recipient of Travel Award for Best Poster at Gordon Conference
Recipient of Travel Award from University of Toledo College of Medicine**

Formally Supervised Trainees

**2012 Prince Ampem (Currently, PhD Student, University of Toledo College of
Medicine). Training in live cell calcium imaging, primary cell culture and
chloride flux Assays**

2011 Kristopher Carbone (Currently, medical student, University of Toledo College

of Medicine). Training in confocal microscopy, sectioning and transfection of organotypic slices

- 2011 Cory Schleppi (bioengineering student, University of Toledo, Training in time differentiated imaging and analysis of exocytosis
- 2010 Douglas Verrill (Currently, medical student, University of Toledo College of Medicine). Training in live cell fluorescent imaging and solution switch systems
- 2010 Susann Moenchgesang (DAAD exchange student, University of Heidelberg). Training in parotid slice preparation and live cell fluorescent imaging

Local Invited Presentations

- June 2012 Invited Talk in the Grand Rounds Seminar series at the Department of Neurosciences, University of Toledo College of Medicine in Toledo, Ohio
- March 2012 Invited Talk at the 3rd Midwestern Graduate Research Symposium, University of Toledo College of Medicine in Toledo, Ohio
Recipient of Student Talk Award
- August 2011 Invited Talk in the Grand Rounds Seminar series on “Purinergic Control of Salivary Regulation” in the Department of Neurosciences, University of Toledo College of Medicine in Toledo, Ohio
- March 2011 Invited Talk at the 2nd Midwestern Graduate Research Symposium,

University of Toledo College of Medicine in Toledo, Ohio

Report of Scholarship

January 2012 Recipient of Student Satellite Scholarship for academic excellence,
Department of Neuroscience, University of Toledo College of Medicine

August 2007 Recipient of predoctoral fellowship, Department of Biomedical Sciences,
University of Toledo College of Medicine

Funding Sources

July 2013 Postdoctoral Award grant from Fight for Sight for investigating the
pathophysiology of dry eye in a novel dry eye mouse model.

Peer reviewed publications in print or other media

- 1. Sumit Bhattacharya, Douglas S. Verrill, Kristopher M. Carbone, Stefanie Brown, David I. Yule, David R Giovannucci. Distinct Contributions by Ionotropic Purinoceptor Subtypes to ATP-Evoked Calcium Signals in Mouse Parotid Acinar Cells. J Physiol 2012 June 1, 590:2721-37.**
- 2. Anita Saxena, Yeshavanth K Banasavadi-Siddegowda, Yifei Fan, Sumit Bhattacharya, Gargi Roy, David R. Giovannucci, Raymond A. Frizzell, and Xiaodong Wang. J Biol Chem 2012 June 1, 287(23):19158-70.**
- 3. Banasavadi-Siddegowda YK, Mai J, Fan Y, Bhattacharya S, Giovannucci DR, Sanchez ER, Fischer G, Wang X. J Biol Chem 2011 Dec 16, 286(50):43071-80.**

Manuscripts in Preparation

- 1. Crosstalk between purinergic receptors and other major calcium signaling pathways in parotid gland**

Sumit Bhattacharya, Prince Ampem, David R. Giovannucci

2. Salivary Gland Organ Slice Culture: An ex vivo model of fluid secretion

Sumit Bhattacharya, Jennifer Diaz Warner, Sasi Arunachalam, Susann Moenchgesang, David Yule, David R. Giovannucci

3. Mechanism of NAADP mediated Calcium signaling in mouse parotid acinar cells

Sumit Bhattacharya, Prince Ampem, Ramadan Ali, Tanya Zhelay, James Slama, David R. Giovannucci

4. Alterations in muscarinic and adrenergic signaling pathways in a Thrombospondin-1^{-/-} mice model of dry eye.

Sumit Bhattacharya, Robin Hodges, Darlene A. Dartt

5. Differences in Calcium signaling and protein secretion in male versus female c57 Balbc mice in lacrimal glands.

Sumit Bhattacharya, Robin Hodges, Darlene A. Dartt