Applicant Biographical Sketch

NAME OF APPLICANT: Joydeep Aoun, Ph. D

eRA COMMONS USERNAME (credential, e.g., agency login):

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Phone: (+1)240-760-9936 (US) / (+91)983-626-1752 (India)

POSITION TITLE: Assistant Professor, Department of Biochemistry,
School of Life Science, Central University of Rajasthan, Kishangarah, Ajmer

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	CHRONOLOGY	SPECIALIZATION
University of Calcutta, India Host Institute: National Institute of Cholera and Enteric Disease, Indian Council of Medical Research (NICED-ICMR), Govt. of India	Ph. D in **Biochemistry** (Science), **Title of Ph.D. Thesis:** Mode of Action of Accessory Cholera Enterotoxin (Ace): Studies on Intestinal Ion Transport.	*Jan'2014-Jun'2019*	Epithelial Electrophysiology
Department of Biochemistry, Ballygunge College, University of Calcutta	M.Sc. in **Biochemistry** (1st class 62.50%)	Aug'2009– Jun'2011	Neuropharmacology
Department of Physiology, City College, University of Calcutta	B.Sc. in **Physiology** (2nd class 58.50%)	July'2006 – Jun'2009	Major: Physiology Minor: Zoology, Chemistry

A. Personal Statement:

I hold a Ph.D. in Biochemistry, specializing in *electrophysiology and molecular biochemistry*. Throughout my doctoral studies, I received comprehensive training in epithelial ion transport physiology, with emphasis in short circuit current (Isc) recording. In my postdoctoral training in the USA, I expanded my expertise by *gaining hands-on experience in Ca^{2+} signalling, patch-clamp, and muscle contraction electrophysiology*, along with proficiency in various imaging techniques. In my present lab, I got intense training to work with exocrine glands including exocytosis & fluid secretion measurement along with animal model of secretory glands disorders. I also expanded my work to understand the role of exocrine secretion in dynamics of the gut microbiome and intestinal innate immunity.

A synergism between cAMP and Ca^{2+} signalling pathway is fundamental for our physiology which is alter in pathophysiology. Membrane phospholipid including phosphatidyl serine (PtdSer) control the dynamics of "signalling microdomain" at membrane contact sites. Thus, spaciotemporal regulation of "signalling microdomain" is essential for cellular function. My research interest focus on regulation of ion transport and membrane trafficking by membrane contact sites in health and disease.

B. Expertise:

- ✓ ***Scientific:*** Electrophysiology, intracellular signaling, ion channels and membrane transport.
- ✓ ***Technical*:**
  - Patch Clamp: whole cell recording, pharmacology of ion channels.
  - Ussing Chamber: Short Circuit current or Isc (transcellular transport), Dilution potential and flux assay (para cellular transport),
  - Microscopy: Ca^{2+} Imaging, Super-resolution, TIRF and Confocal Microscopy, FRET

- Basic Protein biochemistry & molecular biology: Co-IP, immunoassay, protein purification by chromatography & cloning etc.
- Preclinical Model: Hands on training on animal model of GI diseases.

C. Professional Experience (Research and Teaching):

Research Experience:

NIDCR/ National Institutes of Health, Bethesda, USA — 09/2019-
Epithelial Signalling & Transport Section — 04/2025
Visiting Research Fellow (Post-Doctoral)
PI: Dr. Shmuel Muallem

Projects: 1
Title: "PtdSer Scramblase TMEM16F (ANO6) in regulated exocytosis and epithelial fluid secretion". – NIDCR intramural project

- ANO6 essential in epithelial exocytosis, cAMP & Ca^{2+} synergism and fluid secretion by secretory epithelia.

Project 2:
Title: *"Role of exocrine secretion in shaping oral and gut microbiome and innate immunity"*
- The role of saliva microbiome and proteins in progression of IBD

University of Nevada, Reno school of Medicine, USA — 09/2018-
Department of Pharmacology — 08/2019
Post-doctoral Research Fellow
PI: Prof. Normand Leblanc

Projects 1:
Title: *"Role of ANO1 channels and its regulation by PIP_2 in EC-coupling in pulmonary artery myocytes" funded by NIHLB/NIH, USA (Published in JGP 2023 selected for coverage Nov'23)*
- ANO1 facilitate Ca^{2+} oscillation and pulmonary arterial tone.

Project 2:
Title: *"Impact of Calcium-activated chloride channels (CaCCs) in intestinal epithelial ion transport in health and diseases".*
A collaborative project between Dr. Mirajul H Kazi and Prof. Normand Leblanc
- ANO1, the principal CaCC in enterocytes and its activation by bioactive compound from fruit extracts

NICED-ICMR, Kolkata, India
Division of Pathophysiology, — 01/2014-
Doctoral Research Fellow — 08/2018
PI: Dr. Mirajul Haque Kazi

Project 1:
Ph.D. thesis project*:* "*Mode of Action of Accessory Cholera Enterotoxin (Ace): Studies on Intestinal Ion Transport." (Published in JBC 2016)*

- Identified TMEM16F or ANO6 a novel chloride channel in enterocyte and PIP_2 as a signalling molecule in secretory diarrhoea.

Projects 2:

"Luminal K^+ channel blockers - a superior therapeutic intervention in Secretory Diarrhoea."

- Luminal K^+ channel, KCNN4c drive for vectorial Cl^- transport by enterocyte.

National Institute of Biomedical Genomics, Kalyani, India 12/2012-
Research Assistant 03/2013
Project: *Molecular epidemiology of HPV and cervical cancer in Tripura: genetic variations influencing HPV persistence and disease development, Funded by Department of Biotechnology, Govt. of India, 2012.*

Invited *Teaching* Faculty

- Department of Biology, Washington Adventist University, Takoma Park, MD USA — Since 2023
- Biochemistry Department, Vidyasagar College, Kolkata, India — 2012- 2013
- Food and Nutrition Department, Hiralal Majumder Memorial College for Women, Kolkata, India — 2011- 2012.

D. Contribution to Science:

During my groundbreaking doctoral research, I discovered the involvement of the phosphatidylserine (PtdSer) and Calcium-activated Chloride Channel (CaCC), known as *TMEM16F or Anoctamin 6, in secretory diarrhoea*. Additionally, I unveiled a novel *Ca^{2+}-independent mechanism involving PIP2 signalling in enterotoxins-mediated secretory diarrhoea*. Furthermore, I identified a *Potassium channel blocker as a universal antidiarrheal therapy for secretory diarrhoea*. These achievements marked significant steps in my investigative career, fuelling my passion to further contribute to biomedical science.

During my post-doctoral training at Prof. Leblanc lab, I identified a novel role of TMEM16A (ANO1) in formation of *SR-PM contact site to facilitates Ca^{2+} signalling* during smooth muscle excitation-contraction(E-C) coupling *(selected as cover page Nov'23 edition JGP)*. In my current role at the NIH, I resume my investigation on *the regulation of TMEM16F and its impact on secretory epithelia*, which I traced to essential for *epithelial exocytosis and fluid secretion*. I have also found salivary secretion important for gut microbiome and innate immunity. My commitment to advancing scientific knowledge is evident through the publication of several original articles in peer-reviewed journals (JBC, JGP, AJP etc) which is cited over 100 times by field experts. I am now actively seeking a prominent academic platform to share my acquired knowledge and technical expertise in electrophysiology and cellular biochemistry.

E. Research Publication:

1. ¶**Joydeep Aoun**, ¶Mikio Hayashi, ¶ Irshad Ali Sheikh, Paramita Sarkar, Tultul Saha, Rajsekhar Bhowmick, Tanaya Chatterjee, Pinak Chakrabarti, Manoj K Chakrabarti, and Kazi Mirajul Hoque. **Anoctamin 6 Contributes to Cl^- Secretion in Accessory Cholera Enterotoxin (Ace) Stimulated Diarrhoea: An Essential Role for PIP2 signalling in Cholera**. *J Biol Chem 2016 291(52) 26816 - 26836. (IF- 5.48) ¶ Authors share equal contributions.*

2. ***Joydeep Aoun*,*** Elizabeth Akin*, Katie Mayne, Julius Baeck, Michael D. Young, Brennan Sullivan, Kenton M. Sanders, Sean M. Ward, Simon Bulley, Jonathan H. Jaggar, Scott Earley, Iain A. Greenwood, and Normand Leblanc. **ANO1, CaV1.2 and IP3R Form a Localized Unit of EC-Coupling in Mouse Pulmonary Arterial Smooth Muscle.** *J Gen Physiol*ogy (2023) 155 (11): e202213217. *(IF ~ 4) * Authors share equal contributions.*

3. Paramita Sarkar, Tultul Saha, Irshad Ali Sheikh, Subhra Chakraborty, **Joydeep Aoun**, Manoj Kumar Chakrabarti, Vazhaikkurachi M. Rajendran, Shanta Dutta, Kazi Mirajul Hoque. **Zinc ameliorates barrier intestinal barrier dysfunctions by reinstating claudin 2 and 4 on the membranes in Shigellosis.** *American Journal of Physiology – Gastrointestinal and liver physiology 2019 Feb 1; 316 (2): G229-G246. (IF 3.61)*

4. Ayon RJ.,1 Hawn MB., **Aoun J**, Wiwchar M, Forrest AS., Cunningham F, Singer CA., Valencik ML., Greenwood IA., Leblanc N. **Molecular mechanism of TMEM16A regulation: role of CaMKII and PP1/ PP2A.** *Am J Physiol Cell Physiol 317: C1093–C1106, 2019.*

5. Saha Tultul, ***Aoun Joydeep***, Hayashi Mikio, Ali Sheikh Irshad, Sarkar Paramita, Bag Prasanta Kumar, Leblanc Normand, Ameen Nadia, Woodward Owen, Hoque Kazi Mirajul. **Intestinal TMEM16A control luminal chloride secretion in an NHERF1 dependent manner.** *Biochemistry and Biophysics Reports. doi.org/10.1016/j.bbrep.2021.100912*

6. Saha Tultul, **Aoun Joydeep**, Sarkar Paramita, Bourdelais Andrea J., Baden Daniel G., Leblanc Normand, Hamlyn John M., Woodward Owen M., and Kazi Mirajul Hoque. **Cucumis sativus extract elicits chloride secretion by stimulation of the intestinal TMEM16A ion channel**. *Pharmaceutical Biology 2021, VOL. 59, NO. 1, 1006–1013.*

5. Cucumis sativus extract elicits chloride secretion by stimulation of the intestinal

Review Article:

Lee Min Goo, Kim Yonjung, Jun Ikhyun, **Aoun Joydeep**, Muallem Shmuel. **Molecular Mechanisms of Pancreatic Bicarbonate Secretion**, *Pancreapedia: The Exocrine Pancreas Knowledgebase, 2020*

Manuscript under Preparation/Submitted:

1. ***Aoun J***, Kabara A, Ahuja M, Zhang C, Muallem S. **Exacerbating, and protective role of saliva in different phase of Inflammatory bowel disease**. (Submitted)

2. ***Aoun J***, Ahuja M, Lin WY, Zhang C, Muallem S **The PtdSer Scramblase TMEM16F (Anoctamin 6) is Indispensable for Regulated Exocytosis and Epithelial Fluid Secretion**. (Final stage of preparation)

3. ***Aoun J***, Sarkar P., Sheikh IA., and Hoque KM. **Luminal K+ channel KCNN4c blockers - a superior therapeutic intervention than Zinc in all cases of Secretory Diarrhea**. (Under preparation)

4. ***Aoun J***, and Hoque KM. **Accessory cholera enterotoxin (Ace) interact with cysteinyl leukotriene receptor 1 (Cys LTR1) in intestinal epithelial cells for Cl- secretion**. (Under preparation)

Abstracts and presentations:

1. **Aoun J**, Mayne K, Baeck J, Sanders KM., Ward SM., Greenwood IA., Bulley SA., Jaggar JH., Earley S, Leblanc N. **ANO1, CaV1.2, and IP3R Form a Functional Unit of Excitation Contraction Coupling during Agonist-Mediated Contraction of Mouse Pulmonary Arterial Smooth Muscle. Biophysical Journal 2020** 118 (3), 563a-564a

2. Paramita Sarkar**,** Tultul Saha, **Joydeep Aoun**, Subhra Chakraborty, Manoj Kumar Chakraborti, Shanta Dutta, and Mirajul Kazi. **Evidence that Zinc Deficiency Impairs Gut Epithelial Barrier and intestinal Immunity**. **The FASEB Journal. 2018.**vol. 32 no. 1 Supplement 747.16.

3. Mirajul H. Kazi, **Joydeep Aoun**, Paramita Sarkar**,** Tultul Saha, Hemanta Koley, Vazhaikkurachi M. Rajendran, Shanta Dutta**. Efficacy and safety of TRAM-34 over Zinc in secretory diarrhea of endotoxin stimulation. Gastroenterology. 2018.** 154(6): S-53.

4. A. Sheikh, **J. Aoun**, P. Sarkar, T. Saha, M.H. Kazi. **Recombinant accessory cholera enterotoxin of Vibrio cholerae activates ANO6 via RhoA-ROCK-PIP2 signaling to induce secretory diarrhea. Int J Infect dis 2016.** 45S (1):44.

5. P. Sarkar, A. Sheikh, T. Saha, **J. Aoun**, M.H. Kazi. **Zinc restores altered intestinal ion-transport, barrier functions, and counteract inflammatory mediators induced by *Shigella* infection in T84 cells. Int J Infect dis 2016.** 45S (1): 48.
6. Irshad Ali Sheikh, Paramita Sarkar**,** Tultul Saha, **Joydeep Aoun**, Mirajul Kazi. **Epac 1 control intestinal barrier function by regulating JAM-A trafficking via the Rap2C-TNIK pathway. J gastro and hept 2014.** 29(Suppl. 3) 1-332.

7. **Joydeep Aoun**, Malini Ahuja, Wei-Yin Lin, Changyu Zheng, and Shmuel Muallem **PtdSer Scramblase TMEM16F (Anoctamin 6): Indispensable for Regulated Exocytosis and Epithelial Fluid Secretion** GRC - Salivary Glands and Exocrine Biology, 2023

Fellowship:

01/2014 - 08/2018-: Doctoral Research Fellow, funded by ICMR, Govt. of India.
09/2018- 08/2019: Post-doctoral Research Fellow, University of Nevada, Reno funded by NIH, USA.
09/2019-till date: Visiting Research Fellow, NIDCR)/NIH, USA

National exam qualified for research career:

- National Eligibility Test for Doctoral Research Fellowship 2013 conducted by ICMR and CSIR-UGC, Govt. of India. All India ranks 64 and 62.
- GATE (Graduate Aptitude Test for Engineering) 2011 and 2012 conducted by IITs, Govt. of India.

Conference and poster presentation:

- ***American Pancreatic association meeting 2024, Maui, Hi, USA***
  Poster title: The Phosphatidylserine (PtdSer) Scramblase TMEM16F(ANO6) is a novel mediator of regulated exocytosis and potential therapeutic target in pancreatitis.

- **Salivary Gland and Exocrine Biology' 2023 – GRC *& NIH research festival 2023***
  Poster title: PtdSer Scramblase TMEM16F (Anoctamin 6): Indispensable for Regulated Exocytosis and Epithelial Fluid Secretion.

- ***NIH research Festival 2024***
  Poster title: *Saliva Shapes Gut Microbiome & Innate Immunity: Beyond of what we Thought!*

- **Experimental Biology 2022, Philadelphia, USA**

- Poster presentation in **"105th Indian Science Congress"**
  Poster title- *Luminal K^+ channels blocker is superior to Zinc in the reduction of Enterotoxins stimulated intestinal fluid accumulation - a better therapeutic intervention in diarrhoea.*

Awards/Membership:

- 2016: Became Life Member of Indian Science Congress Association (Membership no. L29968)
- 2023: Annual member of American Physiological Society.
- 2024: Annual member of American Pancreatic Association.

I hereby affirm that the above information is true to the best of my knowledge.

Date: 18-06-2025 Signature

Place: Rockville, MD, USA

(Joydeep Aoun)