BIOGRAPHICAL SKETCH

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NAME: Md Motiur Rahman

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

POSITION TITLE: Postdoctoral Fellow

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
Jahangirnagar University, Bangladesh	Bachelor of Science (B.Sc.)	06/2000	Biological Sciences
Jahangirnagar University, Bangladesh	Master of Science (M.Sc.)	06/2001	Biological Sciences
The University of Tokushima, Japan	Doctor of Philosophy (Ph.D.)	03/2013	Pharmaceutical Sciences
National University, Bangladesh	Lecturer	11/2013	Biological Sciences
National Center for Geriatrics and Gerontology, Aichi, Japan	Postdoc Fellow	03/2015	Bone Cell Biology
The University of Tokushima, Japan	Postdoc Fellow	05/2018	Lipid Biochemistry
Marshall University, Huntington, WV, USA	Postdoc Fellow	07/2018 - Till date	Gastroenterology

A. Personal Statement

My long term research interests involve the development of a comprehensive understanding on cellular transport physiology, and how cellular pathways involved in the regulation of nutrient co-transporters contribute to human disease. I am highly motivated to pursue an academic, basic biology, clinical and translational-research career.

My academic training and research experience have provided me with an excellent background in multiple biological disciplines including molecular biology, biochemistry, pharmaceutical chemistry, microbiology, bone cell biology, cancer biology and neuroscience. As a predoctoral student, my research focused on the field of protein biochemistry, especially, human disease related to abnormal accumulation of sialylglycoconjugates. In my postdoc research, I studied coupling factors that are involved in bone homeostasis through bone formation and bone resorption. I have also conducted research on the structure, function and therapeutic potential of prominent species of sphingophospholipids involved in lipid metabolic syndrome.

For my present postdoctoral training, I continue to build on my previous research training and experiences in multiple biological disciplines by using a mammalian system that will allow me to address research questions regarding the regulation of cellular transport physiology in obesity and obesity related disorders. In my present

research, I am working on human inflammatory bowel disease (IBD), such as chronic enteritis, where the malabsorption of water, nutrients, and electrolytes leads to the most disabling morbidities of the gastrointestinal disease. I am also involving in research on L-type amino acid transporter 1 (LAT1) mediates the uptake of essential amino acids and its expression during the progression of human colon cancer, and human breast cancer. My sponsor **UMA SUNDARAM, M.D.** is an internationally recognized leader in the Gastroenterology field and has an extensive record for training postdoctoral fellows. My current research will provide me with new conceptual and technical training in the field of research of key cellular pathways and the underlying mechanisms involved in the obesity and obesity related diseases. In addition, present training plan outlines a set of career development activities designed to enhance my ability to be an independent investigator. My choice of sponsor, research project, and training will give me a solid foundation to reach my goal of studying basic science, clinical and translational sciences.

B. Positions and Honors

Employment Records

04/2006 - 10/2008 Researcher
Encyclopedia of Flora and Fauna of Bangladesh
Ministry of Environment and Forests, Government of Bangladesh
Asiatic Society of Bangladesh

11/2008 - 11/2013 Lecturer
Biological Sciences
National University, Bangladesh

03/2014 - 03/2015 Postdoctoral fellow
Department of Bone and Joint Disease
National Center for Geriatrics and Gerontology (NCGG), Obu, Aichi, Japan

06/2016 – 05/2018 Postdoctoral fellow
Department of Pharmaceutical Health Chemistry
Institute of Biomedical Sciences, Tokushima University, Tokushima, Japan

07/2018 - till to date Postdoctoral fellow
Department of Clinical and Translational Sciences
School of Medicine, Marshall University, Huntington, WV, USA

Professional Society Membership

2010 - 2018 Japanese Biochemical Society
2007 - till to date Asiatic Society of Bangladesh (Associate Member)
2006 - till to date Bangladesh Society of Microbiologists (Associate Member)
2005 - till to date Botanical Society of Bangladesh (Associate Member)

Honors

10/2009 - 03/2013 Received Monbukagakusho Scholarship

C. Contributions to Science

1. Early Career:

My early career contributions were focused on applying my knowledge of environmental microbiology in improving the development of agricultural biotechnology to minimize the drastic use of chemical fertilizers in present agriculture system. More specifically, I worked on biofertilizers, mainly the preparation of nitrogen-fixing microorganisms. My particular role in the project was to identify and characterize the efficient nitrogen-fixing soil bacteria that could be utilized in agricultural biotechnology for high yielding varieties of crops, thereby, playing important role in meeting out the food grain requirement for the growing population of the 21st century.

I. **Rahman MM**, Mubassara S, Hoque S, Khan ZUM. Aerobic heterotrophic bacteria and *Azospirillum* in certain saline soils of Bangladesh. 2006. *Bangladesh J Life Sci*. 18 (1): 105-110.

II. **Rahman MM**, Mubassara S, Hoque S, Khan ZUM. Effect of some environmental factors on the growth of *Azospirillum* species isolated from saline soils of Satkhira District, Bangladesh. 2006. *Bangladesh J Microbiology*. 23 (2): 145-148.

III. **Rahman MM**, Hoque S, Khan ZUM. Effect of *Azospirillum* inoculation on nodulation, chlorophyll content, NPK contents, protein content and nitrogen uptake of lentil. 2007. *Bangladesh J Microbiology*. 24 (2): 105-108.

IV. **Rahman MM**, Hoque S, Khan ZUM. Nitrogen fixation and respiratory activity of *Azospirillum* spp. isolated from saline habitat of Bangladesh. 2007. *Bangladesh J Life Sci*. 19 (2): 55-60.

V. **Rahman MM**, Mubassara S, Hoque S, Khan ZUM. Effect of *Azospirillum* inoculation on growth and yield of lentil. 2007. *Bangladesh J Microbiology*. 24 (1): 30-33.

2. Graduate Career:

My graduate research contributions were focused on human disease related to abnormal accumulation of sialylglycoconjugates. I have experience in isolation and purification of human recombinant protein by *E*. *coli* gene expression system. I generated mutant gene constructs to produce genetically modified human recombinant protein. I have found novel lead compounds, which exhibited inhibitory activity on human recombinant cytoplasmic sialidase. I also studied Molecular Chaperones that assist in protein folding and prevention of degradation of human recombinant proteins (cytoplasmic sialidase, lysosomal sialidase). Results from my research were highly relevant as they provided new details about the workings of enzymatic mechanism and structure of the binding site of human sialidase 2, which were critical data for structure-based drug design of next generation inhibitors against influenza virus neuraminidases or mammalian sialidases.

I. **Rahman MM**, Kitao S, Tsuji D, Suzuki K, Sakamoto J, Matsuoka K, Matsuzawa F, Aikawa S, Itoh K. Inhibitory effects and specificity of synthetic sialyldendrimers toward recombinant human cytosolic sialidase 2 (NEU2). 2013. *Glycobiology*. 23: 495-504.

II. **Rahman MM**, Hirokawa T, Tsuji D, Tsukimoto J, Hitaoka S, Yoshida T, Chuman H, Itoh K. Novel pH-dependent regulation of human cytosolic sialidase 2 (NEU2) activities by siastatin B and structural prediction of NEU2/siastatin B complex. 2015. *Biochemistry and Biophysics Reports*. 4: 234–242.

III. Hitaoka S, Shibata Y, Matoba H, Kawano A, Harada M, **Rahman MM**, Tsuji D, Hirokawa T, Itoh K, Yoshida T, Chuman H. Modeling of Human Neuraminidase-1 and its Validation by LERE-Correlation Analysis. 2013. Chem-Bio Informatics. 13: 30-44.

3. Postdoctoral Career:

3-a. As a postdoctoral fellow, my research was focused on coupling factors that are involved in bone homeostasis through bone formation and bone resorption. I reported that a sufficient number of cells, rather than prior DNA synthesis, is the most critical requirement for osteoclast formation. In addition, my research has provided the useful contribution in bone cell biology that isoforms of platelet-derived growth factor (PDGF), appear to have distinct roles in the cell-cell communication that takes place in the bone remodeling, especially from the osteoclast lineage to mesenchymal cells and vascular cells, thereby stimulating osteogenesis and angiogenesis.

I. **Rahman MM**, Takeshita S, Matsuoka K, Kaneko K, Naoe Y, Sawano AS, Miyawaki A, Ikeda K. Proliferation-coupled osteoclast differentiation by RANKL: Cell density as a determinant of osteoclast formation. 2015. *Bone*. 81: 392-399.

II. **Rahman MM**, Matsuoka K, Takeshita S, Ikeda K. Secretion of PDGF isoforms during osteoclastogenesis and its modulation by anti-osteoclast drugs. 2015. *Biochemical and Biophysical Research Communications*. 462:159-164.

3-b. My previous research was dedicated to study the structure, function and therapeutic potential of prominent species of sphingolipids that could lead to novel ways to modulate pathways involved in lipid metabolic syndrome. Peroxisomes are essential intracellular organelle for development and integrity of our nervous system. This is evident from facts that defects of genes for assembly and biogenesis of peroxisomes and certain kinds of peroxisomal enzymes are lethal. Adrenoleukodystrophy (ALD) is the most common peroxisomal disease. ALD is characterized by the accumulation of very-long-chain fatty acids (VLCFA) in plasma, fibroblasts and tissues. However, toxic compounds or its responsible factors of demyelination are not known clearly. Bioactive lipids that modulate cell viability of neuronal cells via cell proliferation and antiapoptotic effects may have a potential role in prevention of neurodegeneration. Our research provides the evidence that bioactive phospholipids may have a therapeutic value in neural defects as well as a breakthrough for development of new drug for the neurodegenerative diseases.

- **Rahman MM**, Iga E, Shimada A, Miyazaki T, Takahashi N, Fujiwara M, Tsuji K, Kogure K, Tanaka T. Neuroprotective activity of Phytoceramide 1-Phosphate on serum deprivation-induced apoptosis of Neuro2a cells. Consortium of Biological Sciences. 2017, Japan.

- **Rahman MM**, Shimada A, Miyazaki T, Tsuji K, Nakao M, Sano S, Kogure K, Tanaka T. Characterization of the Biological Effects of Ceramide-1-Phosphate. The Japanese Biochemistry Conference: 58, 2017, Japan.

- Tanaka T, **Rahman MM**, Iga E, Yamashita R, Shimizu R, Tsuji K, Shimada A, Nakao M, Sano S, Kogure K. Plasma level of ceramide 1-phosphate and its anti-apoptotic activity. 58th International Conference on the Bioscience of Lipids, Lipid signaling in Health and Disease. 2017, Switzerland.

- Afroz S, Yagi A, Fujikawa K, **Rahman MM**, Morito K, Fukuta T, Watanabe S, Kiyokage E, Toida K, Shimizu T, Ishida T, Kogure K, Tokumura A, Tanaka T. Lysophosphatidic acid in medicinal herbs enhances prostaglandin E2 and protects against indomethacin-induced gastric cell damage *in vivo* and *in vitro*. 2018. *Prostaglandins and Other Lipid Mediators*. 135: 36-44.

3-c. In my present research, I am working on human inflammatory bowel disease (IBD), such as chronic enteritis, where the malabsorption of water, nutrients, and electrolytes leads to the most disabling morbidities of the gastrointestinal disease. In Inflammatory Bowel Disease (IBD), malabsorption of electrolytes (NaCl) and water results in diarrhea. Inhibition of coupled NaCl absorption, mediated by the dual operation of Na:H and Cl:HCO_3 exchange, on the brush border membrane (BBM) of the intestinal villus cells has been reported in IBD.

As a co-investigator, I have demonstrated the molecular mechanisms that are involved in the regulation of Na-glutamine and Na-alanine co-transport by nitric oxide during chronic intestinal inflammation. The novel findings of this study may provide useful therapeutic options to counteract nutrient malabsorption that is known to occur in patients with IBD,

- Arthur S, Manoharan P, Sundaram S, **Rahman MM**, Palaniappan B, Sundaram U. Unique regulation of enterocyte brush border membrane Na-glutamine and Na-alanine co-transport by peroxynitrite during chronic intestinal inflammation. 2019. Int. J. Mol. Sci., 20, 1504.

URL to a full list of published work as found in my Bibliography:
https://www.ncbi.nlm.nih.gov/sites/myncbi/1xQfivv6wupoIa/bibliography/56649569/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Scholastic Performance:

- Doctoral course in the Department of Medicinal Biotechnology, Graduate School of Pharmaceutical Sciences, The University of Tokushima, Japan

Subject	Credits	Grade
Genomic Drug Discovery	2	**A**
Practice of Pharmaceutical Sciences II	6	**A**
Special Lecture for Medicinal Biotechnology	2	**A**
Global Topics of Interdisciplinary Health Care	2	**A**

Grade level:
A: 80 ～100
B: 70 ～79
C: 60 ～69

- Secured **First Class 1st position** in order of merit in Bachelor of Science (B.Sc.) examination
- Secured **First Class 1st position** in order of merit in Master of Science (M.Sc.) examination