



Robby Matthew Zachariah

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Robby Matthew Zachariah obtained his BSc (2002-2005) and MSc (2005-2008) in Biotechnology from the University of Kerala, India. He worked as an intern until 2009 at Jubilant Biosys, India. He then joined Dr. Mojgan Rastegar's lab at the University of Manitoba in 2009 as an MSc student and transferred to PhD in 2011. As part of his career in academics, he completed the International Summer Institute of Scientific Teaching & Educational Leadership for Bioscience Research, Department of Education, University of Manitoba, Winnipeg, Canada in 2014. Currently, he is finishing up his PhD studies in the field of neuroepigenetics.

During Robby's graduate studies, he was the recipient of several awards and scholarships including the Manitoba Health Research Council (MHRC) Graduate Studentship (2009/2011; 2012-2014), University of Manitoba, International Graduate Student Entrance Scholarship (2010), International Graduate Student Scholarship (2011-2012). He was also awarded the Department of Biochemistry and Medical Genetics Phyllis J. McAlpine Graduate Fellowship (2013). Robby's research work was highlighted by several poster awards including the Manitoba Neuroscience Network poster awards (2015), Manitoba Medical Service Foundation Poster Award (2013), Child Health Research Day, Honorable mention (2015). He has attended many local and national neuroscience conferences and his representation were funded by travel awards such as Manitoba Institute of Child Health (MICH) Travel Award (2012, 2014), Manitoba Medical College Foundation Graduate Student Travel Award (2013), University of Manitoba Faculty of Graduate Studies Travel Award (2012) and Canadian Association of Neuroscience Travel Award (2011).

Every year since 2010, he volunteers in knowledge translation activity by participating in the Discovery Day describing the application of techniques used in medical science to secondary school students and teachers.

RESEARCH OVERVIEW

Identifying neuronal targets and functions of MeCP2 isoforms

Methyl CpG Binding Protein 2 (MeCP2), an epigenetic regulator that is capable of recognizing and binding to methylated DNA. Alternative splicing of *MECP2/Mecp2* gene generates two isoforms MeCP2E1 and MeCP2E2, which differ in terms of their expression, functions and regulation. As part of his graduate research, he initially studied the endogenous expression patterns of MeCP2E1 and MeCP2E2 in various brain regions as well within different brain cell types using custom MeCP2 isoform specific antibodies (PLOS ONE 2012; PLOS ONE 2014). Through these studies, he has demonstrated the differential expression of MeCP2 isoforms. Robby's studies also contributed towards the elucidation of the role of DNA methylation in the regulation of MeCP2 isoforms, during neural stem cell differentiation, and in response to environmental insults such as ethanol exposure (Molecular Autism, 2013; Experimental Neurology, 2015). His current studies aim to determine the function of individual MeCP2 isoforms in neurons, and its relevance to MeCP2 associated disorders such as Rett Syndrome. The overall goal of his research is to gain a comprehensive knowledge on the expression, regulation and function of MeCP2 isoforms and their role in neuronal development and function.

PUBLICATIONS

Journal Articles (research)

- Olson, C.O.*; **Zachariah, R.M.***; Ezeonwuka, C.D.*; Liyanage, V.R.; Rastegar, M. *Brain region-specific expression of MeCP2 isoforms correlates with DNA methylation within Mecp2 regulatory elements*. PLoS One, 2014, 9, (3), e90645.
***Equal first authorship**
- Liyanage, V.R.; **Zachariah, R.M.**; Rastegar, M. *Decitabine alters the expression of Mecp2 isoforms via dynamic DNA methylation at the Mecp2 regulatory elements in neural stem cells*. Mol Autism, 2013, 4, (1), 46.
- Liyanage, V.R.; **Zachariah, R.M.**; Davie, J.R.; Rastegar, M. *Ethanol deregulates Mecp2/MeCP2 in differentiating neural stem cells via interplay between 5-methylcytosine and 5-hydroxymethylcytosine at the Mecp2 regulatory elements*. Exp Neurol, 2015, 265, 102-117.
- Barber, B.A.; Liyanage, V.R.; **Zachariah, R.M.**; Olson, C.O.; Bailey, M.A.; Rastegar, M. *Dynamic expression of MEIS1 homeoprotein in E14.5 forebrain and differentiated forebrain-derived neural stem cells*. Ann Anat, 2013, 195, (5), 431-440.
- **Zachariah, R.M.***; Olson, C.O.*; Ezeonwuka, C.; Rastegar, M. *Novel MeCP2 isoform-specific antibody reveals the endogenous MeCP2E1 expression in murine brain, primary neurons and astrocytes*. PLoS One, 2012, 7, (11), e49763.
***Equal first authorship**

Journal Articles (reviews)

- Liyanage, V.R.B.*; **Zachariah, R.M.***; Delcuve, G.P.; Davie, J.R.; Rastegar, M. *Chromatin Structure and Epigenetics. In Advances in Genetics Research*. Urbano, K.V., Ed.; Nova Science Publishers, 2015; Vol. 13, pp 57-88.
***Equal first authorship (Cross-referenced)**
- Marzban, H.; Del Bigio, M.R.; Alizadeh, J.; Ghavami, S.; **Zachariah, R.M.**; Rastegar, M. *Cellular commitment in the developing cerebellum*. Front Cell Neurosci, 2014, 8, 450.
- **Zachariah, R.M.**; Rastegar, M. *Linking epigenetics to human disease and Rett syndrome: the emerging novel and challenging concepts in MeCP2 research*. Neural Plast, 2012, 415825.

Book Chapters

- Liyanage, V.R.B.*; **Zachariah, R.M.***, Delcuve, G.P., Davie, J.R., Rastegar, M. (2012). *New Developments in Chromatin Research: An Epigenetic Perspective*. Neil M. Simpson and Valerie J. Stewart. New Developments in Chromatin Research. 1: 29-58.
***Equally contributing first authors**

Conference Publications

- **Zachariah, R.M.**; Rastegar, M. *Investigating MeCP2 isoform-specific functions in neurons; Insights on the role of MeCP2 in Rett Syndrome*. Int J Dev Neurosci, 2015, 47, (Pt A), 62.
- Liyanage, V.R.B., **Zachariah R.M.**, Rastegar (2015). *Epigenetics regulation of MeCP2 in neural stem cells and adult brain: Implication of therapeutic strategies for MeCP2-related neurodevelopmental disorders*. Int J Dev Neurosci 47:64.