Ratnam Seelan, Ph.D.

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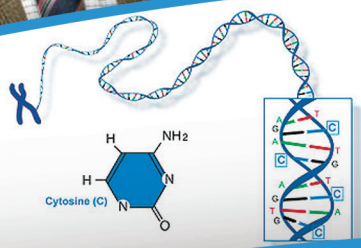

Dr. Seelan's primary research interests are in understanding the epigenetic basis for developmental defects such as cleft palate. In particular, he seeks to understand how the environment influences gene expression during murine secondary palate development via epigenetic mechanisms, such as DNA methylation and microRNA regulation. Knowledge of this largely nascent area will not only help contribute to our understanding of the complex etiology underlying cleft palate but also identify the processes and mechanisms required for normal palate development. Using two complementary approaches - 1) promoter microarrays probed with genomic DNA fragments, selectively enriched for methylated CpG residues obtained from developing secondary palate tissues; and, 2) CpG methylation profiling of candidate genes, identified by mRNA profiling analysis - a number of differentially methylated genes, including those encoding microRNAs, have been identified. His current research focuses on validating the methylation status of these genes during mouse secondary palate development, evaluating their spatio-temporal expression profiles in the developing palate, and determining their role in palatogenesis. One such gene that has been identified is *Sox4* whose expression in the secondary palate is dependent on critical CpG residues localized in a DMR (differentially methylated region) upstream of the promoter. Another area of interest is the integration of the aforementioned gene methylation microarray data with microRNA and mRNA expression profiles of the developing murine secondary palate to identify major signaling pathways and genes that are critical for palatogenesis. Aspects of these latter studies, recently funded by an NIH RO3 grant, are being undertaken in collaboration with Drs. P. Mukhopadhyay and G. Brock. Dr. Seelan continues to seek additional funding support for his varied interests.

Grants Funded:

Role: Co-Investigator
Title: Mood Stabilizing Medications and the Inositol Signaling System
Funding Agency: Veterans Administration Merit Award
(PI: Dr. R. Parthasarathy)
Direct Costs Funded: $1,176,800.

Role: Co-Investigator
Title: Epigenetic Regulation of Gene Expression During Orofacial Development
Funding Agency: NIH R03 (Co-PIs: Partha Mukhopadhyay, Guy Brock).
Direct Costs Funded: $300,000

Peer Reviewed Publications (2011-2012)

Seelan RS, Pisano MM, Greene RM, Casanova MF & Parthasarathy R. Differential methylation of the gene encoding myo-inositol synthase (Isyna1) in rat tissues. Epigenomics 3: 111-124 (2011). PMC3154894.

Stagner JI, **Seelan RS**, Parthasarathy RN. Maintenance of aerobic metabolism increases immunoisolated islet survival. Islets 3: 89-92 (2011). PMID: 21471739.

Rezzoug F, **Seelan RS**, Bhattacherjee V, Pisano MM & Greene RM. Chemokine-mediated migration of mesencephalic neural crest cells. Cytokine 56: 760-768 (2011). PMID: 22015108.

Seelan RS, Mukhopadhyay P, Pisano MM, Greene RM. Developmental epigenetics of the murine secondary palate. ILAR Journal, 53: 240-252 (2012)

Lakshmanan J, **Seelan RS**, Vadnal RE, Janckila AJ, Casanova MF, Parthasarathy LK, Parthasarathy RN.
Proteomic analysis of rat prefrontal cortex after chronic lithium treatment. J Proteomics Bioinform 5: 140-146 (2012).

Seelan RS, Mukhopadhyay P, Warner DR, Pisano MM, Greene RM. Epigenetic regulation of Sox4 during palate development Epigenomics 5:131-146 (2013).

External professional activities:

Ad hoc reviewer - Toxicol. Sci., 2011; Afr. J. Biotech., 2012; BMC Genomics, 2012;