Research Activities:

A quarter of a million babies—3% of all infants born in the US each year—have some mental or physical defect that is evident at birth. Since the causes of nearly all birth defects are largely unknown, research into molecular regulatory mechanisms responsible for normal embryogenesis provides the framework for investigations into the etiology of abnormal embryonic development.

Craniofacial malformations occur with a frequency of 1 in 600 live births annually in the United States. Our previous studies have provided substantial evidence supporting the premise that various cellular signal transduction pathways interact to regulate cell proliferation and cell differentiation in embryonic craniofacial tissue. Such interactions represent the underpinnings of a complex and delicately balanced developmental system where morphogenesis and cellular differentiation of the craniofacial region are mediated by the sequential expression of molecular signals. Our studies dealing with molecular analyses of gene function in the embryo—utilizing the developing craniofacial region—are designed to provide definition and clarification of developmental signaling pathways critical for normal embryogenesis as well as identification of foci for perturbation and attendant fetal abnormalities.

Current studies—selected specifics outlined briefly below—are designed to identify means by which signal transduction pathways, known to be critical in development of the craniofacial region, regulate gene expression and embryonic development.

Overview of selected laboratory investigatory areas:

- microRNAs & epigenetic regulation of craniofacial development
- Transcriptional coactivators and craniofacial & neural tube development.
- Transcriptional coactivators and folate-mediated development.
- Cigarette smoke-induced intrauterine growth retardation & adverse developmental outcomes.
- TGFß/Smad signaling mechanisms in embryonic craniofacial development.

Grants Funded:

NIH (NICHD) Research Grant, **RM Greene** – PI; MM Pisano – Co-I; (R01–HD053509) "Transcriptional Coactivators and Pregnancy Outcomes"

NIH Research Grant, **RM Greene** – PI; (R01–DE018215) "Nutritional Epigenetics and Orofacial Development"

NCRR Center for Biomedical Research Excellence, **RM Greene** – PI – (P20-RR/DE17702) "Molecular Determinants of Developmental Defects"

Kosair Charities – Birth Defects Center Postdoctoral Fellowship, **RM Greene** – PI

Peer Reviewed Publications:

Horn K, Warner DR, Pisano MM, **Greene RM**. PRDM16/MEL1 expression in the developing mouse embryo. Acta Histochem 113:150-155 (2011). PMCID: PMC2891916

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

Greene RM and MM Pisano, guest editors, Epigenetic Processes in Development, Birth Defects Research A: Clinical and Molecular Teratology, (edit. DM Juriloff), Wiley-Blackwell, Hoboken, NJ (2011).

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Brock G, Mukhopadhyay P, Pihur V, Webb C, **Greene RM**, Pisano MM. MmPalateMiRNA, an R Package Compendium Illustrating Analysis of miRNA Microarray Data. Source Code for Biology and Medicine Jan 8;8(1):1. [Epub ahead of print] (2013). PMID: 23298515.

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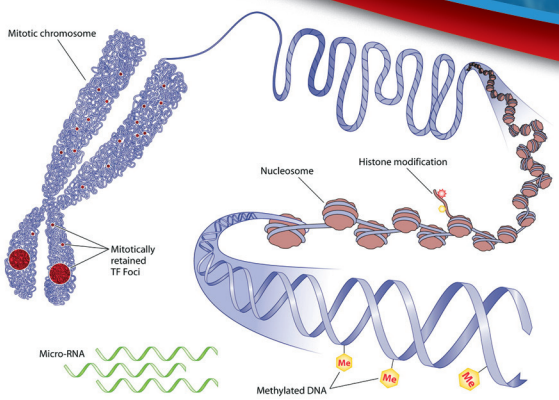

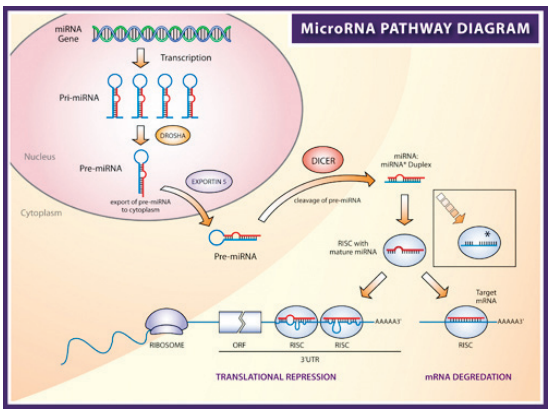

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External Professional Activities:

- Editorial Board, Orthodontics and Craniofacial Research
- Editorial Board, Associate Editor, Birth Defects Research, Part A: Clinical and Molecular Teratology
- Editorial Board, Progress in Orthodontics
- Editorial Board, Frontiers in Craniofacial Biology subsection of Frontiers in Physiology and Dentistry
- Expert Witness – Schiller Osbourn, Barnes & Maloney, 2010-2011
- Member, Board of Directors, Spina Bifida Association of Kentucky, Inc.
- Scientific Consultant - Genetics & IVF Institute, Inc., Fairfax, VA
- Invited Speaker – 7th KY Innovation Entrpreneurship Conference & 16th KY EPSCOR Joint Conference – Louisville, Ky
- Invited Reviewer – NIDCR - U01 Competitive Revision of The FaceBase Consortium: Functional Genomics of Craniofacial Development and Disease (RFA-DE-09-003) in response to PAR-11-144 Competitive Revision Applications for NIDCR-funded Cooperative Agreements.
- Invited Speaker - Louisville Rotary Club – "Risk Factors for Birth Defects"
- Invitation to serve on the Developmental Biology Subcommittee (CHHD-C) at EKS-NICHD to review P01 applications.
- Invited Reviewer – NIDCR - ZDE1 MH 13 Special Emphasis Panel - "Competitive Revision Applications for NIDCR-funded Cooperative Agreements - U01 revision applications dealing with the creation of mouse models of craniofacial disorders.