



Robert M. Greene, Ph.D.

Professor and Chair

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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.

*They grow up
so quickly*



- Transcriptional coactivators and craniofacial & neural tube development.
- Transcriptional coactivators and folate-mediated development.
- Cigarette smoke-induced intrauterine growth retardation & postnatal cognitive deficits.
- TGFβ/Smad signaling mechanisms in embryonic craniofacial development.

Grants Funded:

Role: Principal Investigator

Title: Transcriptional Coactivators and Pregnancy Outcomes

Funding Agency: NIH (NICHD)

Direct Costs Funded: \$1,321,365

Role: Principal Investigator

Title: Nutritional Epigenetics and Orofacial Development

Funding Agency: NIH

Direct Costs Funded: \$900,000

Role: Principal Investigator

Title: Molecular Determinants of Developmental Defects

Funding Agency: NCCR Center for Biomedical Research Excellence

Direct Costs Funded: \$12,072,292

Role: Principal Investigator

Title: Birth Defects Center Postdoctoral Fellowship

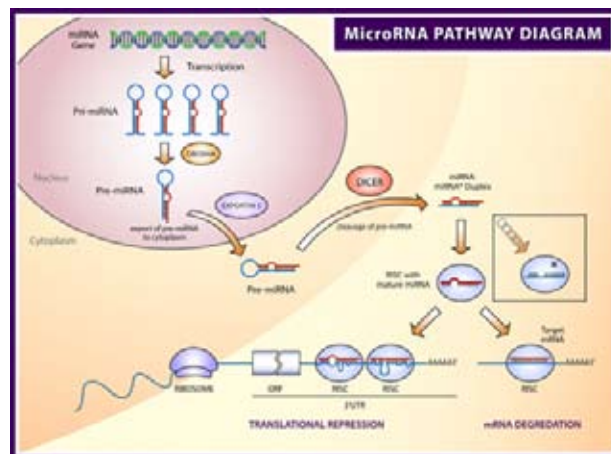
Funding Agency: Kosair Charities

Direct Costs Funded: \$45,000

Peer-Reviewed Publications:

Singh S, Yin X, Mukhopadhyay P, Pisano MM and **Greene RM**. Mitogen activated protein kinase signaling pathways in developing orofacial tissue. *Birth Defects Research, Part A: Clinical and Molecular Teratology* 79:35-44 (2007). PMID: 17177285

Why can't I shave?



Bhattacharjee V, Mukhopadhyay P, Singh S, Johnson C, Philipose J, Warner C, Hackmiller R, **Greene RM** and Pisano MM. Neural crest and mesoderm lineage-dependent gene expression in developing orofacial tissue. *Differentiation* 75:463-477 (2007). PMID: 17286603

Warner D, Horn K, Mudd L, Webb CL, **Greene RM**, Pisano MM. PRDM16/MEL1: A novel Smad binding protein expressed in murine embryonic orofacial tissue. *Biochimica Biophysica Acta – Molecular Cell Research* 1773:814-820 (2007). PMID: 17467076

Warner DR, **Greene RM**, Pisano MM. Target Assessment-PRDM16 (MEL1). Targeted Proteins Database (TPdb) (available on-line) (2008).

Greene RM, Pisano MP. Perspectives in orofacial cleft research II: Molecular Mechanisms. In: *Comprehensive Cleft Care*, Edit. Losee JE, Kirschner RE., McGraw-Hill (accepted for publication) (2008).

Mukhopadhyay P, Webb C, Warner D, **Greene RM**, Pisano, MM. BMP signaling dynamics in embryonic orofacial tissue. *J Cellular Physiol* 216:771-779 (2008). PMID: 18446813

Esposito ER, Horn KH, **Greene RM**, Pisano MM. An animal model of cigarette smoke-induced in utero growth retardation. *Toxicology* 246:193-202 (2008). PMID: 18316152

Horn K, Horn KH, Esposito ER, **Greene RM**, Pisano MM. The effect of cigarette smoke exposure on developing folate binding protein-2 null mice. *Reproductive Toxicology* 26:203-209.

Warner DR, Smith HS, Webb CL, **Greene RM**, Pisano MM. Expression of Wnts in the developing murine secondary palate. *Internat J Develop Biol* (accepted for publication).

Bhattacharjee V, Horn K, Singh S, Webb CL, Pisano MM, **Greene, RM**. CBP/p300 and associated transcriptional coactivators exhibit distinct expression patterns during murine craniofacial and neural tube development. *Internat J Develop Biol* - (accepted for publication).