

The Intersection of Epigenetics, Education, Environmental Exposures,
and Public Health Messaging

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Center for Genomics & Healthcare Equality
<http://depts.washington.edu/cghe/>

Today's Goals

- Framing of the project
 - Personal and research interests
- Development of the project
- Challenges, Strategy and Decision-making
- Dissemination of the project
- Discussion questions
- Watch Video
- Think, pair, share

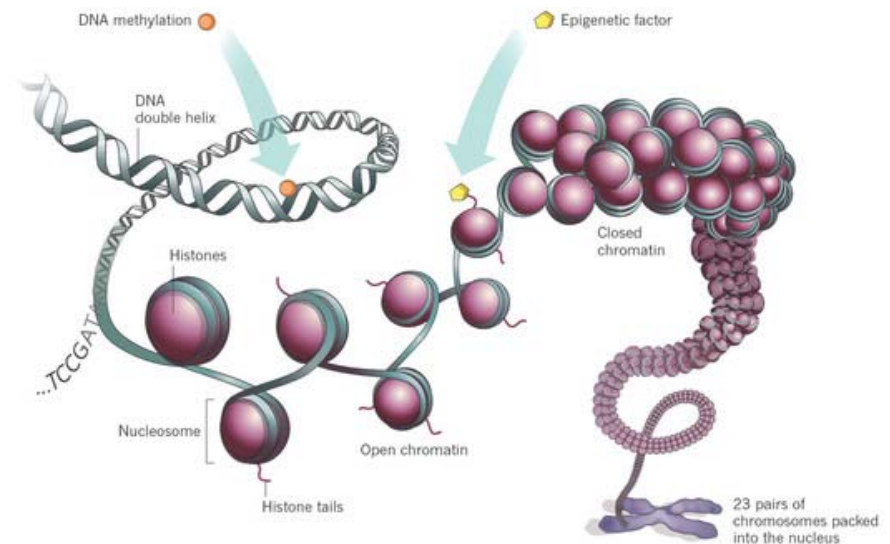
Environmental Embodiment

- Environmental cues lead to change in epigenetic regulation
 - SDoH can become drivers of chronic disease
 - Stress can trigger FAST life course strategy in next generation
 - Chemical exposures can interfere with epigenetic regulation
 - Chemical exposures can prematurely trigger gene networks

Epigenetic Mechanisms

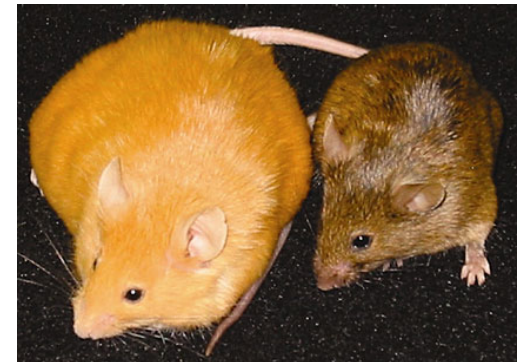
Epigenetic mechanisms are *flexible* genomic parameters that can *alter* genome function under *exogenous* influence.

- Epigenetic change links exposures to disease outcomes
- Methylation examples
 - Bees – Royal Jelly
 - Mouse vs Man
 - Twins & Agouti Mouse
 - GR Receptor Expression



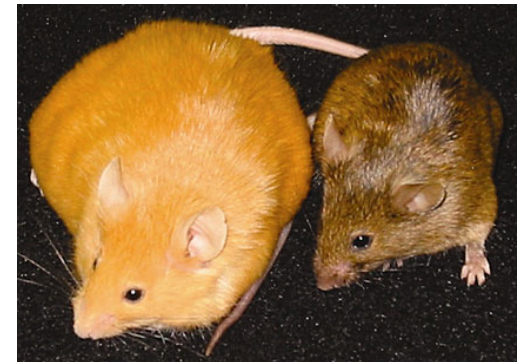
Epigenetic Mediation: DNA Methylation

- Silences gene expression in eukaryotes
 - Jumping Genes: LINE and ALU
 - Global hypomethylation allows activation of jumping genes
 - Global hypomethylation implicated in genomic instability and risk for cancer
 - Transposable Elements
 - Retrotransposons: LINEs
 - 30% of the genome
 - Embed into different section of the genome
 - LINEs: 100/500,000 active



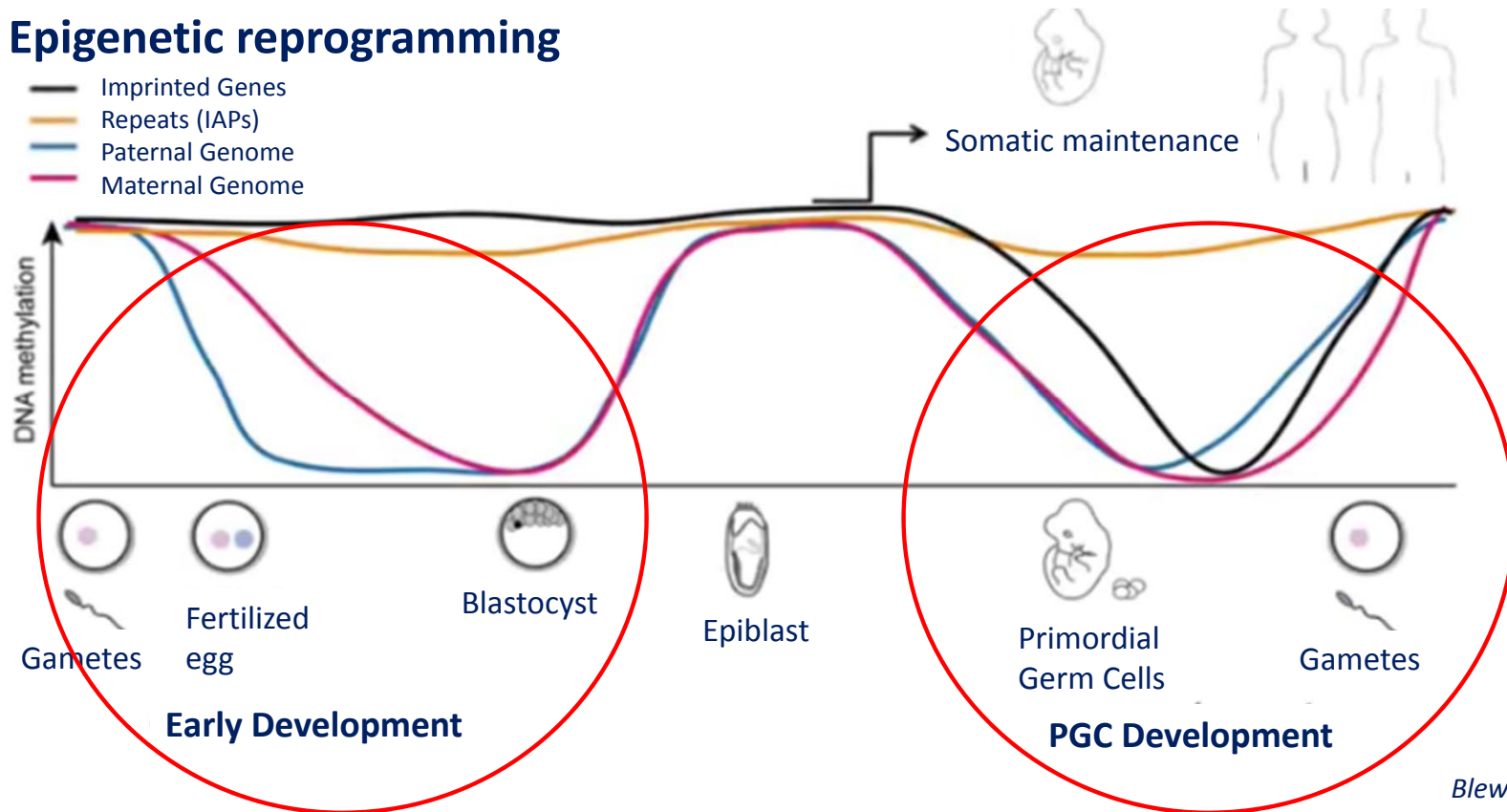
Exposures Associated with Hypomethylation

- Global hypomethylators
 - Arsenic
 - Cadmium
 - Methylmercury
 - Lead
 - BPA
 - Pesticides
 - Smog
 - Tobacco Smoke
 - Many more



Epigenetic Mediation: Methylation Timing

Epigenetic reprogramming

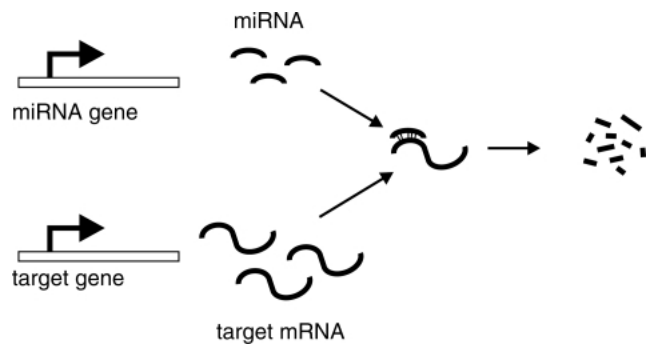


Blewitt 2013

Lorelei Walker UW SPH IPHG 2014

MicroRNA

- MicroRNA (miRNA)
 - Non-coding RNA
 - 1-4% of all human genes
 - Target up to half of coding genome
 - Fine tune gene expression
 - Tight control over development
 - Effected by multiple environmental agents



Cell fate specification
DNA repair
DNA methylation
Cell proliferation
Cell differentiation
Developmental timing
Cell cycle control
Angiogenesis control
Pattern formation
Morphogenesis regulation
Circadian rhythm
Synapse function

Fat metabolism
Insulin secretion
Stem cell maintenance
Resistance to viral infection
Inflammation
Immunomodulation
Apoptosis
Proinflammatory stimuli
Antiinflammatory stimuli
Neuronal differentiation
Neurogenesis
Neuroprotection

Video

- To develop a video making the concept of environmental embodiment / epigenetics understandable for the general public.
- Empower citizens
 - Empowers individuals
 - Empowers communities
 - Enables deliberative democracy
 - Increase genetic literacy
 - Understand BPA and EDCs as a risk to health: “pollution is personal”
 - Easy actions to avoid pesticides and BPA containing products
 - Identify those products

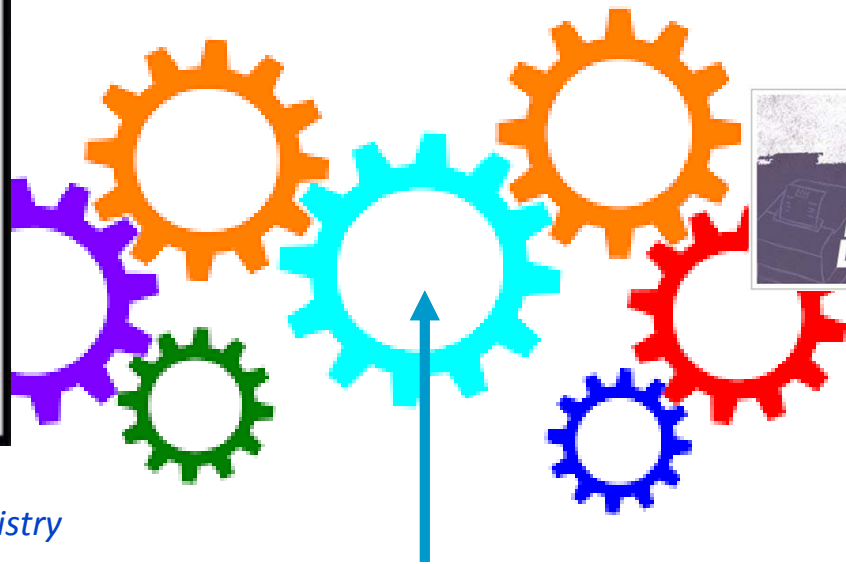
Development of Project

- Need:
 - To connect the dots for the public of how environmental exposures can directly affect health outcomes.
- Approached CEEH Outreach Team.
 - Secured a small grant to work with Evan Stuart Productions.

Where Public Health Stands in Messaging



*Better Living Through Chemistry
Industry = Jobs
Progress*



Public Health
Messaging?



*Extreme Advocacy
Radical*

Epigenetic Video: Domains of Importance

- Guides
 - Plain language; accurate, accessible, and actionable information
 - Positive realistic actions that do not contain judging language
- Decision Needs
 - Audience?
 - Which mechanism to teach
 - Teach global hypomethylation or gene regulation
 - Positive vs negative messaging: Resilience over susceptibility
 - Which exposures
 - Moving away from personal responsibility and towards social justice
 - Which health outcomes
 - Susceptibility vs Causality
 - What actions

Video: Strategy

- Process
 - Sketching mechanism
 - Brainstorming with non-scientific/non-public health videographer
 - Literature review for applicable exposures
 - Key informants
 - Focus groups
 - Executive power (me)

Epigenetic Video: Dissemination

- Vimeo and YouTube
- Twitter
 - @STEMEduc; @ScienceEduc; @science_teacher; @Science_Ed; Retweet: @USC_EH_Outreach; Retweet: @marilynmoche15; Retweet: @ecogenetix & @PHCafe
- Found on smt-source.com
- Facebook
 - IPHG & HEC; Science Teacher Resource; science education & technology; Found on “Epigenetics Research Team”
- Listservs
 - wsffnet@npogroups.org; NW-KIDS-ENV-HEALTH@LISTSERV.WA.GOV; cheiceh@lists.healthandenvironment.org; CGHE Listserv; Beti Thompson's Cohort of farm workers (Spanish Version); Alumni for USF Department of Integrative Biology Page (in progress); SPH YouTube Channel Featured Videos
- Groups
 - WSPHA Poster; NEAR Working Group across DoH employees: Neuroscience Epigenetics ACEs Resilience; Interlake HS Honors Society; Science Educators; March of Dimes WA State Coordinator
- LinkedIn
 - Epigenetics; HELIX Exposome project; Epigenetics Psychology (professionals)

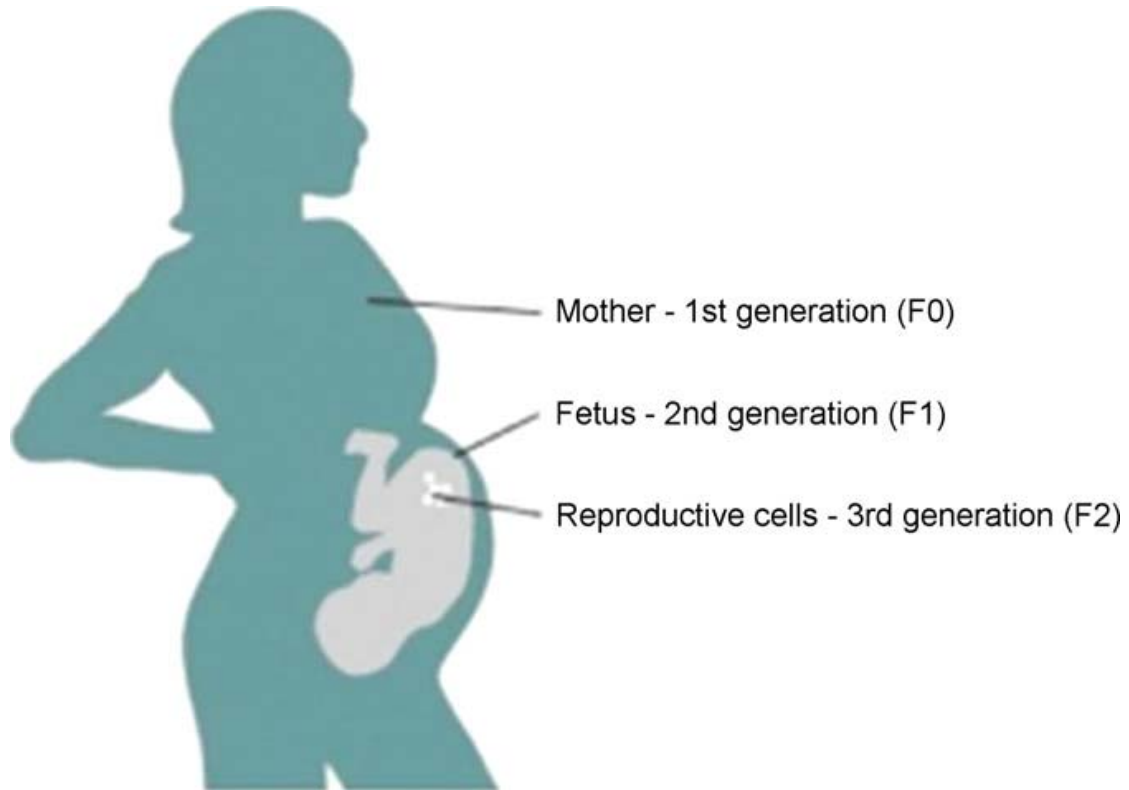
The Video and Reflection

- <https://www.youtube.com/watch?v=ujLppvMqUOI>
- Watch video with these questions in mind
 - What do you visually notice as you watch the video?
 - What is your takeaway?
 - What about the messaging stands out to you?
 - How did we do?
 - What was missing?

Thank You: Support and Mentorship

- Funding: Center for Genomics and Healthcare Equality
 - P50 HG 3374 from the National Human Genome Research Institute
 - Center for Ecogenetics and Environmental Health
- Mentorship
 - Institute for Public Health Genetics
 - Dr. Kelly Edwards (Committee Chair)
 - Center for Genomics and Healthcare Equality
 - Dr. Helene Starks (Committee Member)
 - Institute of Neurotoxicology and Neurological Disorders
 - Dr. Steven Gilbert (Committee Member)
 - Transdisciplinary Stress
 - Dr. Paula Nurius (BRFSS and RDA Data on WA State)
 - Department of Anthropology
 - Dr. Dan Eisenberg (GSR)

Prenatal / Fetal Period



Unique time when 3 generations can experience the same exposure.