The Epigenome and Developmental Origins of Adult Health and Disease

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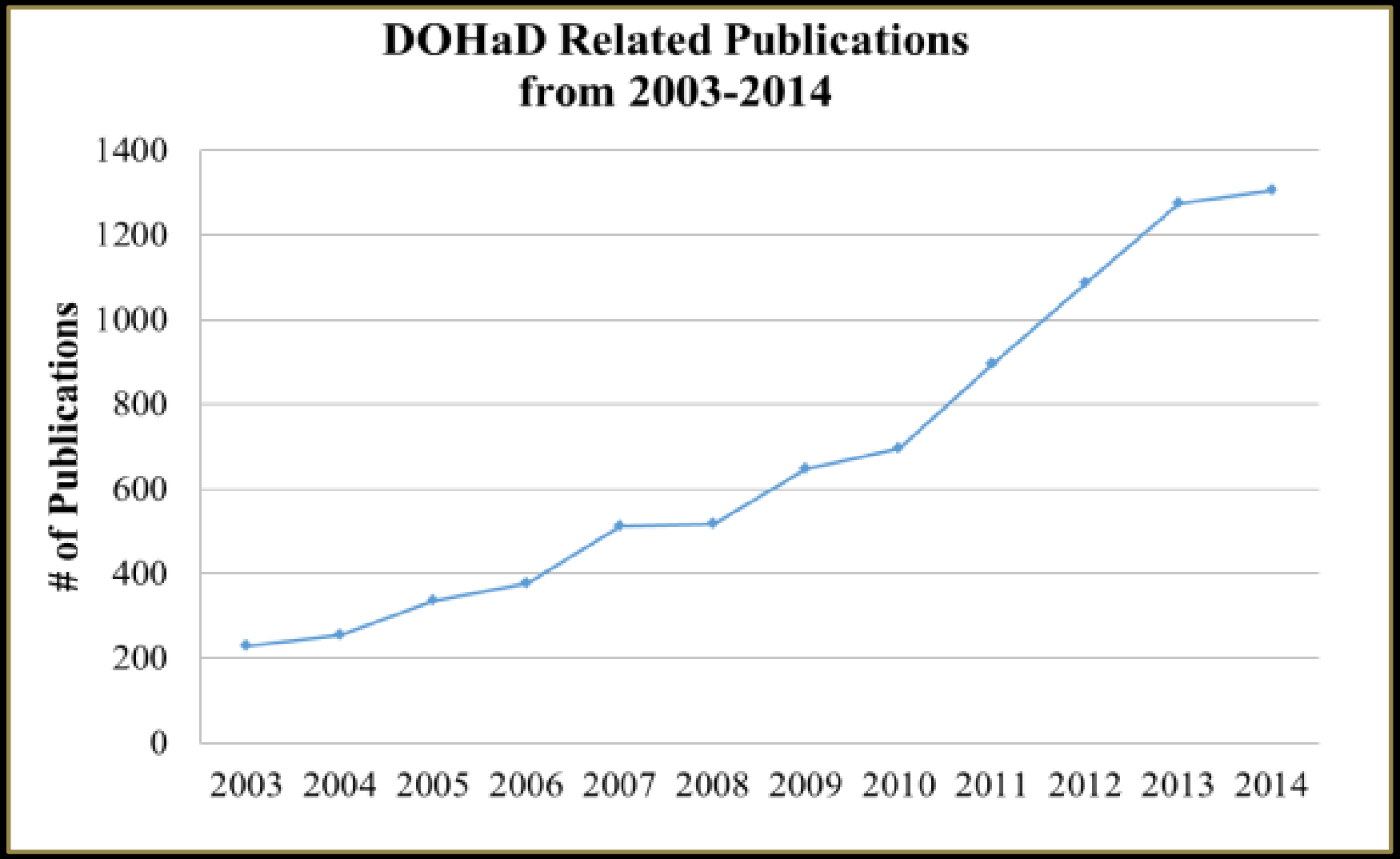
Environment Special:
The oceans—why 10% of our planet is in danger
The Facebook Movie:
The secret history of social networking
TIME
How the first nine months shape the rest of your life
The new science of fetal origins

Developmental Origins of Adult Health and Disease (DOHaD)

- The environmental conditions that an organism, including humans, experiences prior to birth can dramatically shape later health for better or worse.
- This concept was first articulated by the late Sir David Barker, and thus was originally coined the “Barker Hypothesis”.
- It was subsequently changed to Fetal Origins of Adult Disease (FOAD).
- More recently, it is now termed Developmental Origins of Adult Health and Disease (DOHaD).
- This idea has gained increasing currency and may help explain many non-communicable diseases (NCD) in various organ systems.

DOHaD and Related Publications



Based on a Scopus search performed in April 2015

Interaction of Genetics and DOHaD Programming and Offspring Health Outcomes

Susceptibility

Genetic

+

Precipitating Factors

Environmental Chemicals
Obesity
Diet
Physical Inactivity
Stress

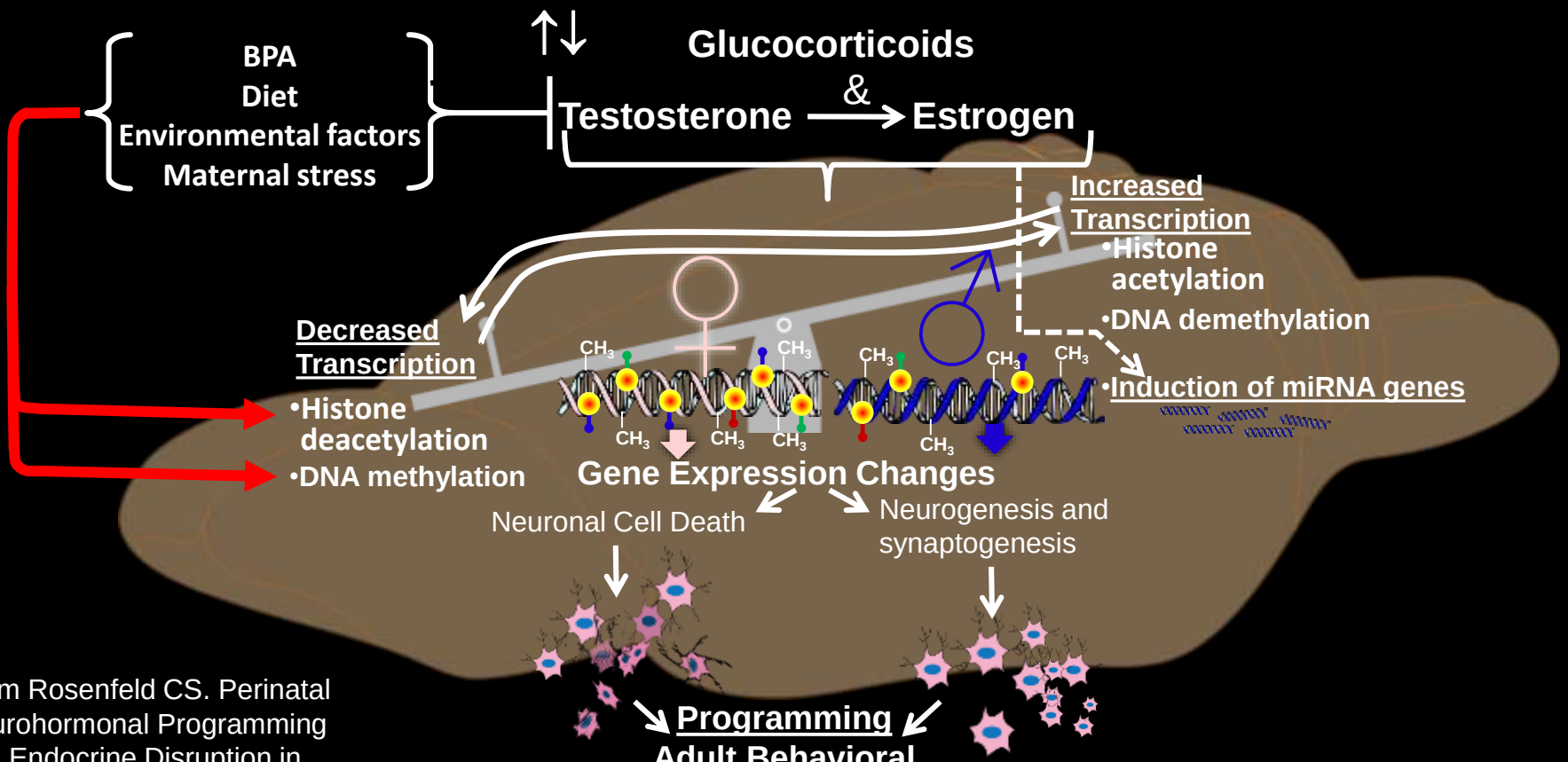
DOHaD (Programming)

Modified from:
http://www.diapedia.org/type-2-diabetes-mellitus/early-life-determinants-and-t2dm

Offspring DOHaD Effects: Both Mom and Dad May be to Blame

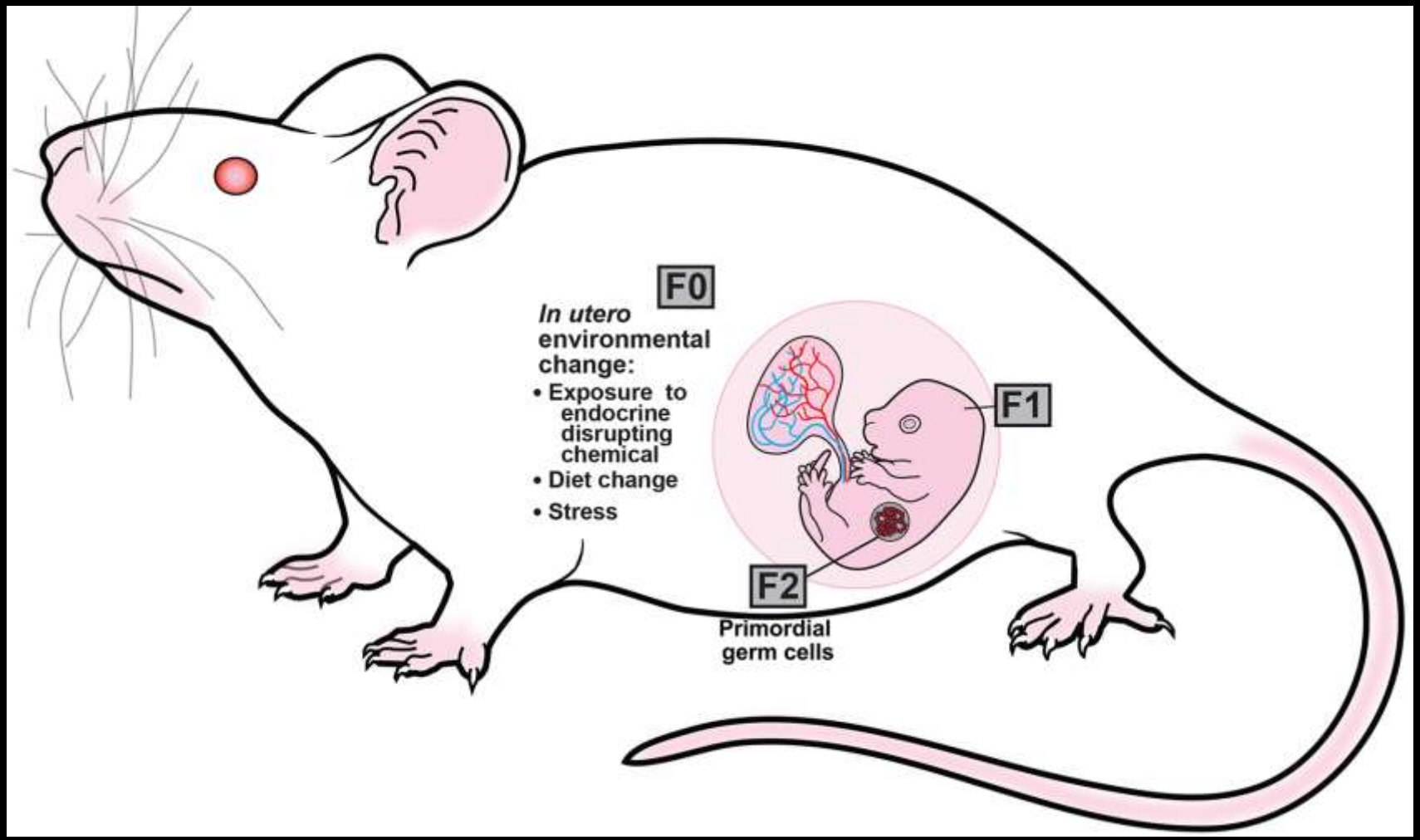
Time Period	Mom	Dad
Periconceptional (Prior to Fertilization)	Disruptions in oocyte maturation	Epigenetic/phenotypic disruptions in spermatozoa development
Periconceptional (Prior to fertilization)		Small RNA changes in spermatozoa that may occur during spermatogenesis or after transits in the epididymis
Periconceptional (Prior to fertilization) or Early Embryonic Period		Changes in seminal fluid that directly impacts zygotic development or interacts with the female reproductive system to affect embryo development
***In Utero* Period**	Alterations in the in the intra-uterine environment (such as those shown on previous slide) that may affect the placenta or fetal development	
Postnatal Period	Alteration in lactational secretions- such as transfer of environmental chemicals, stress hormones, etc, and insufficient colostrum transport (protects neonate against infectious diseases) in some animal species	
Postnatal period	Compromised maternal care	Compromised paternal care, especially in species who are monogamous and biparental

How Neurobehavioral Programming May be Vulnerable to DOHaD Effects



From Rosenfeld CS. Perinatal Neurohormonal Programming and Endocrine Disruption in Rosenfeld CS (Ed) The Epigenome and Developmental Origins of Adult Health and Disease. UK Elsevier Publications, *In Press* 2015.

DOHaD Effects May Be Transmitted to Future Generations: Transgenerational Effects



From Rosenfeld CS. Animal models of transgenerational epigenetic effects In: Tollefsbol T (ed.) Transgenerational Epigenetics. London, UK: Elsevier Publications.; 2014: 123-145.

Search Terms to Help Identify Scholarly Articles and Information on Social Media Sites Detailing Current DOHaD Research

Search Term
Developmental origins of health and disease
DOHaD
Fetal Programming
FOAD or Fetal Origins of Adult Disease
Barker Hypothesis
Maternal diet
Paternal diet
Maternal stress
Paternal stress
Environmental chemicals and fetal exposure
Fetal exposure and endocrine disruption
Maternal obesity
Paternal obesity
Germline transmission
Placenta
Maternal metabolic disorder
In utero environment
In utero environmental factors
Perinatal period and disease risk
Antenatal period
Fetal sex differences
Periconceptional period and offspring development
Developmental exposure
Fetal epigenome
Fetal transcriptome

From Rosenfeld CS. Informational Resources for Developmental Origins of Health and Disease in Rosenfeld CS (Ed) The Epigenome and Developmental Origins of Adult Health and Disease. UK Elsevier Publications, *In Press* 2015.

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