

**Improving the Health  
of America's  
Mothers and Children:  
A Life Course Perspective**

**State of Champions  
Alabama's Campaign for Healthier Babies**

**RSA Activity Center  
Montgomery, Alabama  
Friday, January 10, 2014**

**Faculty**

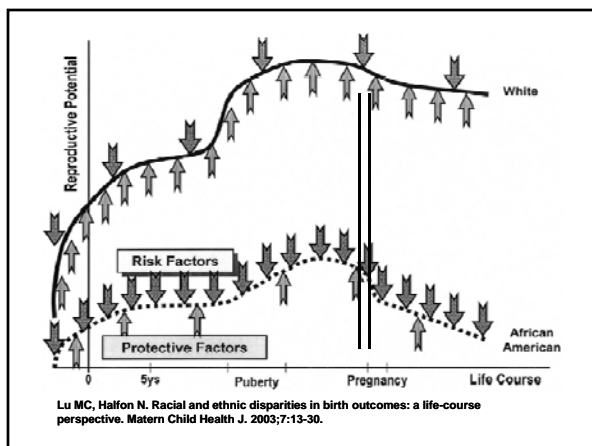
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Maternal and Child Health Bureau  
Health Resources and Services  
Administration  
Rockville, Maryland**

*"Human progress is neither  
automatic nor inevitable . . .  
Every step toward the goal of justice  
requires sacrifice, suffering,  
and struggle; the tireless exertions  
and passionate concern  
of dedicated individuals."*

**- Dr. Martin Luther King, Jr**

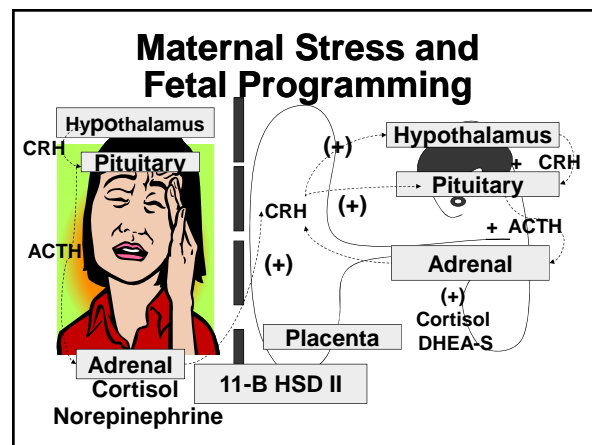
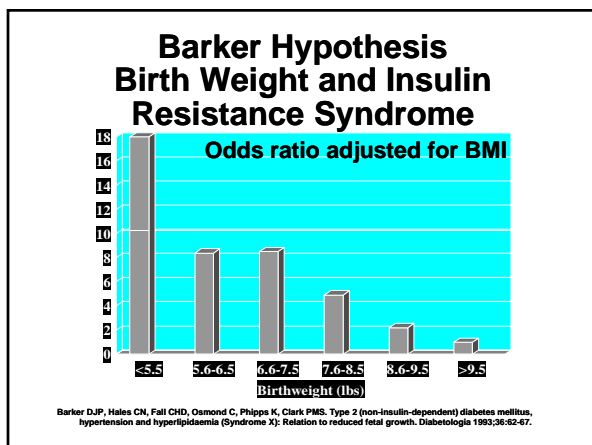
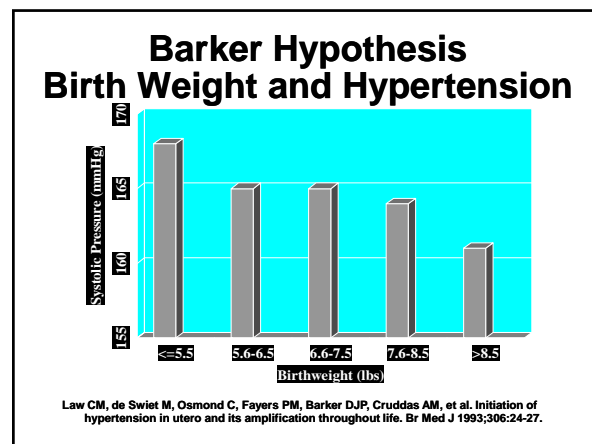
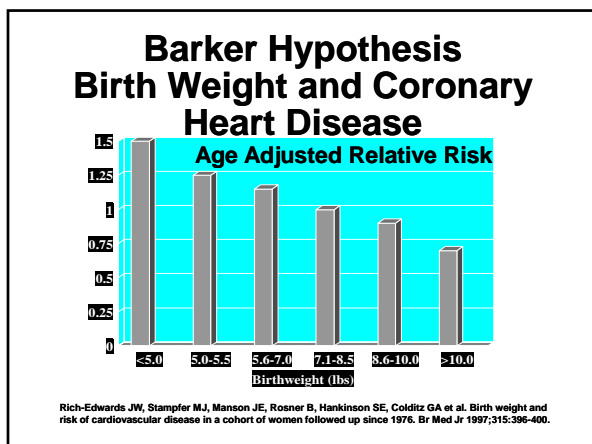
**Life Course Perspective**

- A way of looking at life not as disconnected stages, but as an integrated continuum



**Life Course Perspective**

- Early programming
- Cumulative pathways



### Prenatal Stress and Programming of the Brain

- Prenatal stress (animal model)
  - Hippocampus
    - Site of learning and memory formation
    - Stress down - regulates glucocorticoid receptors

### Prenatal Stress and Programming of the Brain

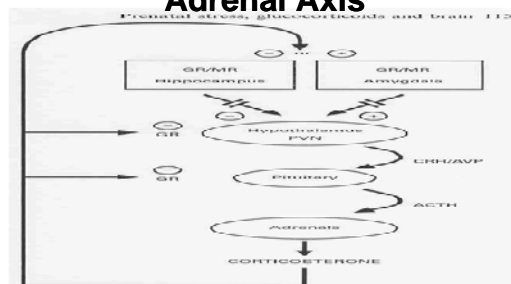
- Loss of negative feedback; overactive HPA axis
- Amygdala
  - Site of anxiety and fear
  - Stress up-regulates glucocorticoid receptors

## Prenatal Stress and Programming of the Brain

- Accentuated positive feedback; overactive HPA axis

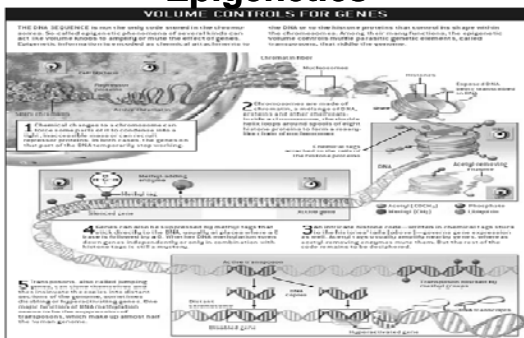
Welberg LAM, Seckl JR. Prenatal stress, glucocorticoids and the programming of the brain. *J Neuroendocrinol* 2001;13:113-28.

## Prenatal Programming of the Hypothalamic – Pituitary - Adrenal Axis



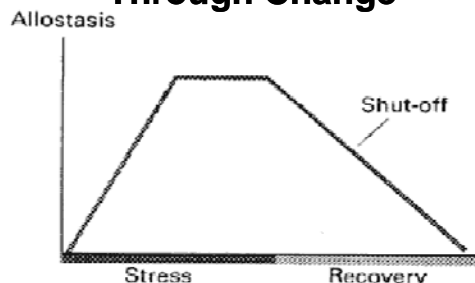
Welberg LAM, Seckl JR. Prenatal stress, glucocorticoids and the programming of the brain. *J Neuroendocrinol* 2001;13:113-28.

## Epigenetics



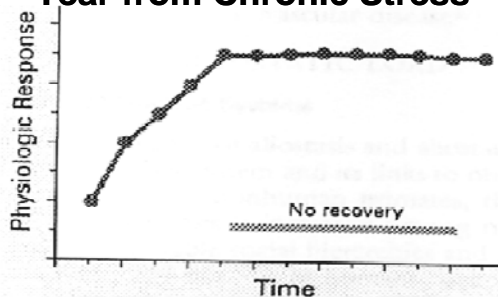
Gibbs WW. The Unseen Genome: Beyond DNA. *Scientific American* 2003

## Allostasis: Maintain Stability Through Change



McEwen BS. Protective and damaging effects of stress mediators. *N Eng J Med.* 1998;338:171-9.

## Allostatic Load: Wear and Tear from Chronic Stress



McEwen BS. Protective and damaging effects of stress mediators. *N Eng J Med.* 1998;338:171-9.

## Stressed vs. Stressed Out

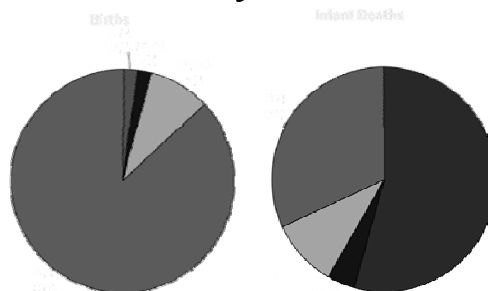
- Stressed
  - Increased cardiac output
  - Increased available glucose
  - Enhanced immune functions
  - Growth of neurons in hippocampus and prefrontal cortex

### Stressed vs. Stressed Out

- **Stressed Out**
  - Hypertension and cardiovascular diseases
  - Glucose intolerance and insulin resistance
  - Infection and inflammation
  - Atrophy and death of neurons in hippocampus and prefrontal cortex

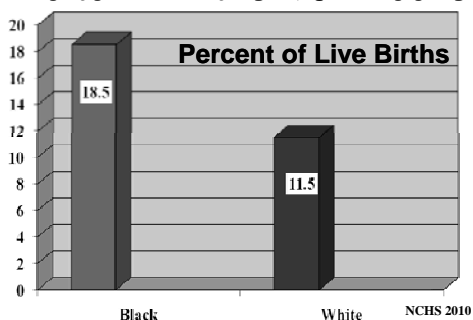
McEwen BS. Stressed or stressed out: What is the difference? J Psychiatry Neurosci 2005; 30:315-8

### Preterm Birth and Infant Mortality, US, 2007

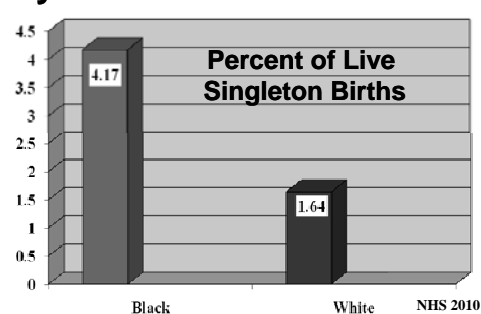


Source: NCHS, linked birth/infant death data set

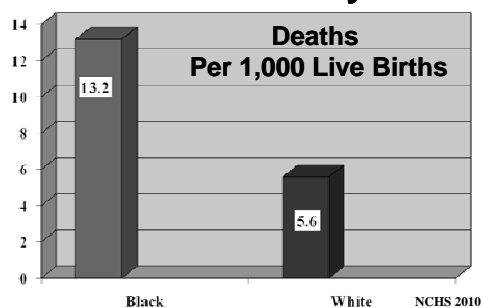
### Racial and Ethnic Disparities Pre-term Births < 37 weeks



### Racial and Ethnic Disparities Very Preterm Births < 32 Weeks



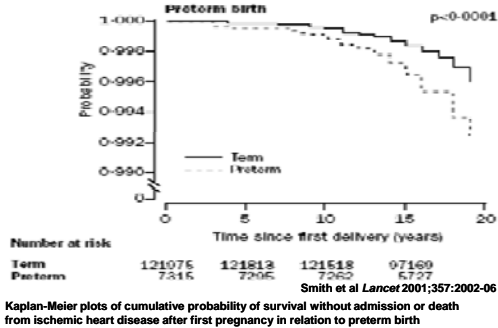
### Racial and Ethnic Disparities Infant Mortality



### Rethinking Pre-term Birth

- Vulnerability to pre-term delivery may be traced to not only exposure to stress and infection during pregnancy, but host response to stress and infection (e.g. stress reactivity and inflammatory dysregulation) patterned over the life course (early programming and cumulative allostatic load)

### Preterm Birth and Maternal Ischemic Heart Disease



***“If you want 1 year of prosperity,  
grow grain.***

***If you want 10 years of prosperity,  
grow trees.***

***If you want 100 years of prosperity,  
grow people.”***

***-Chinese Proverb***

***“If you want to grow healthy people,  
you start by improving  
maternal and child health.”***

***-Not a Chinese Proverb***