Early Life Roots of Health

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What Happens Early Affects the Rest of Our Lives

“…many adult diseases should be viewed as developmental disorders that begin early in life…”

American Academy of Pediatrics
“The Lifelong Effects of Early Childhood Adversity and Toxic Stress”
Pediatrics 2012;129:e232-e246

“…a substantial component of metabolic disease risk has a prenatal developmental basis.”

Diabetes 2011;60:1528-1534
How Does Early Life Adversity Get Programmed In?

Stress and inadequate nutrition in the womb can lead to:

- Changes in gene expression (epigenetic “on/off switches”)
- Reduced muscle development
- Reduced organ development (e.g., pancreas, kidneys)
  - Small for gestational age birthweight
- Changes in the “set points” for several hormone systems, including those that affect glucose regulation, appetite, stress response, etc.
- Insulin resistance and visceral fat starting even before birth
  - So birthweight may be normal or even large for gestational age
What Happens Early Affects the Rest of Our Lives

“Psychological distress at any point in the life course is associated with higher cardiometabolic risk. …even if distress appears to remit by adulthood, heightened risk of cardiometabolic disease remains. …early emotional development may be a target for primordial prevention and for promoting lifelong cardiovascular health.”

*J Am Coll Cardiol* 2015;66:1577–86
How Does Early Life Adversity Get Programmed In?

Stress and inadequate nutrition in the first few years of life can lead to:

• Stressed parents unintentionally transmitting trauma to their children (intergenerational trauma, ACEs)
• Stress response “set points” can be further ramped up
  • Risk for using substances which “externally modulate” this, including food
• Stress affects brain development, behavior, cognition, ability to attach to others
• Food insecurity alters appetite regulation, increases risk for behavior problems, depression
The Developing Brain is Affected By Stress

• “What fires together, wires together”
• Complex process of “sculpting” the brain, converting experience into neuronal changes
• Cortisol, Brain-Derived Neurotrophic Factor
• Chronic stress and depression:
  - shrink the hippocampus and prefrontal cortex
    » ↓ Memory, selective attention, executive function/decision making
  - potentiate growth of the amygdala
    » ↑ Fear, hypervigilance, anxiety, aggression

McEwen, *Physiol Rev* 2007;87:873-904
Early Social-Emotional Functioning and Adult Health

Nearly 800 kindergarteners evaluated on social competence skills by their teachers

- 8 questions, including whether they shared with others, were helpful, cooperated, followed directions
  - Results formed an overall score for each child
- Participants tracked for up to 20 years

Results were striking

- Those with lower scores: more likely to drop out of high school, abuse drugs or alcohol, have employment problems
- Those with high scores: more likely to achieve higher education, jobs, and overall health
- For every 1-point ↑, child was twice as likely to graduate from college
- For every 1-point ↓, child had a 67% higher chance of being arrested by early adulthood

Am J Public Health. 2015;105:2283-2290
Prenatal/Early Life Nutrition, Stress

Alcoholism
Liver Disease, HIV
Addiction

Violence
Traumatized Parenting
Depression

Epigenetic and developmental programming

Physiologic/Behavioral Ability to Respond to Life Stressors

Alcohol Use
Drug Abuse

Emotional Responses
Overeating

Diabetes
Obesity
Heart Disease

Seeds planted for the next generation

Prenatal/Early Life Nutrition, Stress

Adverse Childhood Experiences

Discrimination

Poverty

Epigenetic and developmental programming
Quality of Early Life Relationships/Learning
“We …know that sound maternal and fetal nutrition, combined with positive social-emotional support of children through their family and community environments, will reduce the likelihood of negative epigenetic modifications that increase the risk of later physical and mental health impairments.”

Center on the Developing Child at Harvard University
Working Paper 10, 2010
“Early Life Investments Substantially Boost Adult Health”

Carolina Abecedarian Project

• 4 cohorts of disadvantaged children born 1972-77
  – Intervention provided from birth to age 5 years
• Intervention:
  – Development of language, emotional regulation, cognitive skills
  – Caregiving/supervised play
  – Nutrition: 2 meals and a snack at childcare center
  – Primary pediatric care

In their mid-30s: lower prevalence of CVD and metabolic disease risk factors including blood pressure, A1C, obesity; better HDL-cholesterol

Science 2014;343:1478-1485
What can be done?

- **Prevent**
  - Home visiting (e.g., Family Spirit, Nurse-Family Partnership)
  - Parenting training
  - Nutrition: address food insecurity
- **Screen/Detect/Intervene** in children as early as possible
  - Early detection/intensive case management programs
  - Where: Well child clinics, child care/Head Start, schools
- **Increase protective factors** in children and youth
  - Excellent child care/Head Start programs
  - Having one caring adult has been shown to make a huge difference
    - e.g., Boys & Girls Clubs
  - Healthy sense of cultural self-identity
    - AI/AN culture, spirituality, language, art, games; mentoring by elders
Stress, Trauma, and Food Insecurity are at the root of many problems, including obesity and diabetes. But they are also preventable.

What can we do to make a difference?