Adverse Childhood Experiences and Chronic Disease:

The Elephant in the Room

Robert Anda, MD, MS

www.cdc.gov/ace

www.acestudy.org
The Walk to Paradise Garden

W. Eugene Smith
Stress
(adrenaline, cortisol)

Unpredictable
Severe

Predictable
Moderate

Number of Episodes
Chronicity*

Vulnerability

(Poly)genetics
Epigenetics
Intrauterine
exposures*

Resilience
Persistent Stress Changes Brain Architecture

Normal

Typical neuron—many connections

Toxic stress

Damaged neuron—fewer connections

Prefrontal Cortex and Hippocampus

Sources: Radley et al. (2004)
Bock et al. (2005)
Seeing the Pain
America's physicians confront family violence
SYNAPTIC DENSITY: Synapses are created with astonishing speed in the first three years of life. For the rest of the first decade, children’s brains have twice as many synapses as adults’ brains.

Drawings supplied by H.T. Chugani.
**Healthy Brain**
This PET scan of the brain of a normal child shows regions of high (red) and low (blue and black) activity. At birth, only primitive structures such as the brain stem (center) are fully functional; in regions like the temporal lobes (top), early childhood experiences wire the circuits.

**An Abused Brain**
This PET scan of the brain of a Romanian orphan, who was institutionalized shortly after birth, shows the effect of extreme deprivation in infancy. The temporal lobes (top), which regulate emotions and receive input from the senses, are nearly quiescent. Such children suffer emotional and cognitive problems.
The Adverse Childhood Experiences (ACE) Study

Examines the health and social effects of ACEs throughout the lifespan among 17,421 members of the Kaiser Health Plan in San Diego County

A Primary Care Setting…
Educated…
Middle Class..
Predominantly White…
Adverse Childhood Experiences Are Common

**Household dysfunction:**

- Substance abuse: 27%
- Parental sep/divorce: 23%
- Mental illness: 17%
- Battered mother: 13%
- Criminal behavior: 6%

**Abuse:**

- Psychological: 11%
- Physical: 28%
- Sexual: 21%

**Neglect:**

- Emotional: 15%
- Physical: 10%
Adverse Childhood Experiences Rarely Occur in Isolation…

They come in groups.
ACEs tend to come in groups…

<table>
<thead>
<tr>
<th>Additional ACEs (%)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>&gt;5</th>
</tr>
</thead>
</table>

*If you had:*

| A battered mother | 95 | 82 | 64 | 48 | 52 |
## Adverse Childhood Experiences Score
### Biologic Stress “Dose”

<table>
<thead>
<tr>
<th>ACE Score</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>33%</td>
</tr>
<tr>
<td>1</td>
<td>26%</td>
</tr>
<tr>
<td>2</td>
<td>16%</td>
</tr>
<tr>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>4 or more</td>
<td>16%</td>
</tr>
</tbody>
</table>
ACEs, Smoking, and Lung Disease

ACE Score

Percent With Health Problem (%)

ACE Score
- 0
- 1
- 2
- 3
- 4 or more

Early smoking initiation
Current smoking
COPD
The ACE Score…
Alcohol Use and Abuse

ACE Score
0 1 2 3 4 or more

Percent with alcohol related problem

Alcoholic
Married an Alcoholic
A Focus on Mental Health...
The ACE Score and a Lifetime History of Depression

- **Women**
- **Men**

Percent depressed (%) vs. ACE Score:
- 0: 10%
- 1: 20%
- 2: 40%
- 3: 50%
- >=4: 60%

Graph shows a higher percentage of women versus men with higher ACE scores.
The ACE Score and the Prevalence of Attempted Suicide
Leading Causes of Death...
The ACE Score and the Prevalence of Coronary Heart Disease
Adverse Childhood Experiences As a National Health Issue

ACEs have a strong influence on:
- adolescent health
- reproductive health
- smoking
- alcohol abuse
- illicit drug abuse
- sexual behavior
- mental health
- risk of revictimization
- stability of relationships
- performance in the workforce
Adverse Childhood Experiences As a National Health Issue

**ACEs increase the risk of:**
- Early Death
- Heart disease
- Lung cancer
- Chronic Lung disease
- Liver disease
- Suicide
- Injuries
- HIV and STDs
- Autoimmune Disease
States With ACE Studies in 2009

6 States

Source: Behavioral Risk Factor Surveillance System, CDC.
States With ACE Studies in 2009-2010

Source: Behavioral Risk Factor Surveillance System, CDC.
Beham, (Hans) Sebald (1500-1550): Hercules slaying the Hydra, 1545 from The Labours of Hercules (1542-1548).
The Walk to Paradise Garden

W. Eugene Smith
“The Creation of Adam”
Michelangelo  1508–1512
A Public Health Framework For Change

Treatment

Education  ↔  Prevention

All must consider
Intergenerational transmission
Limits of Understanding
by Paul Klee (1879-1940)