

ACEs, Chronic Stress and Chronic Disease

Dr Olivia Kasirye

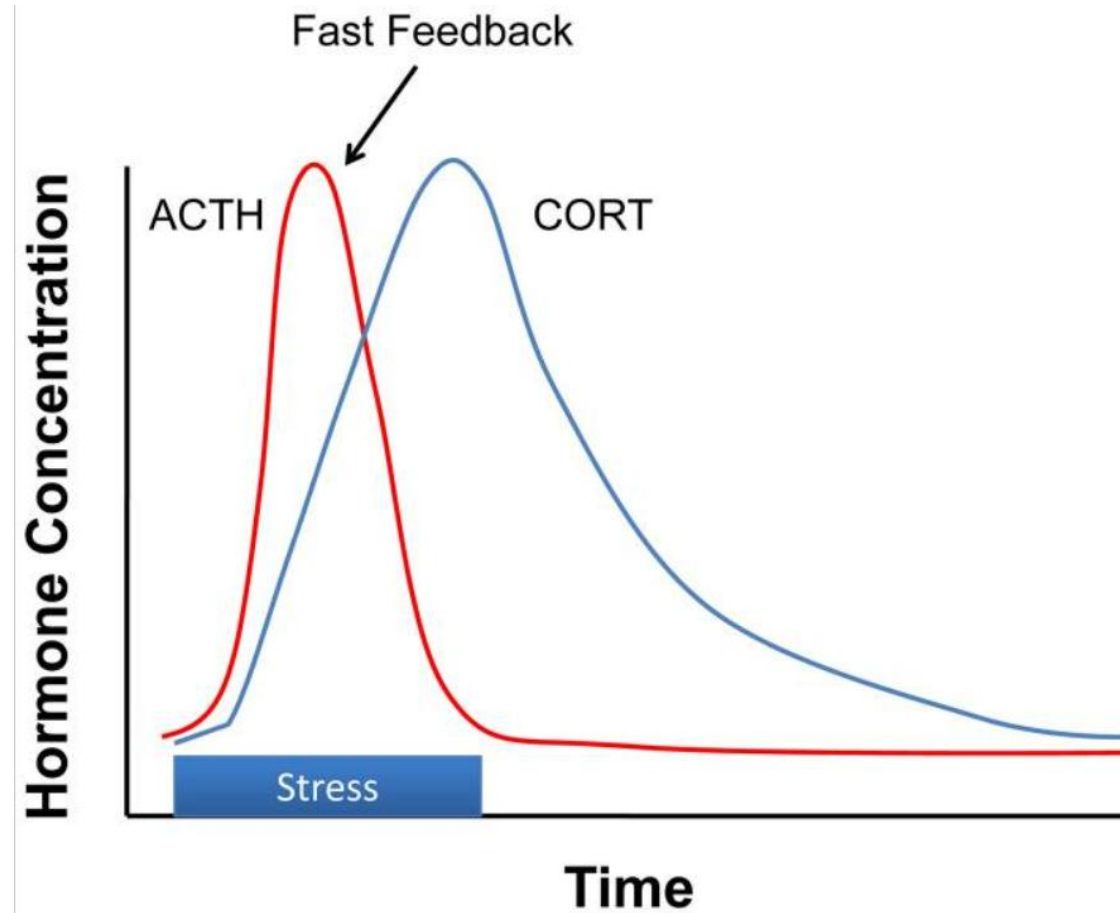
The Stress corticosteroid Axis

- formally known as the [Hypothalamic-Pituitary-Adrenal \(HPA\) Axis](#)—is the primary neuroendocrine system that commands the body's response to physical and emotional stress. It operates in a synchronized chain reaction involving the brain and the adrenal glands to release stress hormones.

How does the HPA work?

- In response to a stressful situation, the autonomic nervous system triggers your hypothalamus to release corticotrophin-releasing hormone (CRH).
- CRH triggers the anterior pituitary to release adrenocorticotrophic hormone (ACTH).
- ACTH then triggers the adrenal glands, specifically your adrenal cortex, to release cortisol.
- The adrenal medulla releases adrenaline (epinephrine) in times of stress to trigger the “fight-or-flight” response.
- There is a negative feedback loop - the cortisol in the body then triggers the hypothalamus to stop making CRH, thus ending the stress response.

Normal stress response



HPA Axis Dysfunction

Chronic stress can lead to HPA axis dysfunction and cause consistently increased cortisol levels in the body. This increases the risk for a variety of health conditions, like:

- **Immune system dysfunction**, like autoimmune conditions and increased inflammation throughout the body.
- **Mental health conditions**, like mood disorders, anxiety disorders and post-traumatic stress disorder (PTSD).
- **Metabolic diseases**, like diabetes, obesity and cancer.
- **Cardiovascular diseases**, like high blood pressure and vascular damage.
- HPA axis dysfunction may also play a role in memory loss and neurodegenerative conditions like Alzheimer's disease.

The Toxic Stress Response Defined

The National Academies of
SCIENCES • ENGINEERING • MEDICINE



“prolonged activation of the stress response systems that can disrupt the development of brain architecture and other organ systems, and increase the risk for stress-related disease and cognitive impairment, well into the adult years...”

ACEs and toxic stress

Adverse childhood experiences, or ACEs, are potentially traumatic events that occur in childhood (0-17 years). Examples include:

- Experiencing violence, abuse, or neglect.
- Witnessing violence in the home or community.
- Having a family member attempt or die by suicide.

Also included are aspects of the child's environment that can undermine their sense of safety, stability, and bonding. Examples can include growing up in a household with:

- Substance use problems.
- Mental health problems.
- Instability due to parental separation.
- Instability due to household members being in jail or prison.

Impact of ACEs on chronic Disease

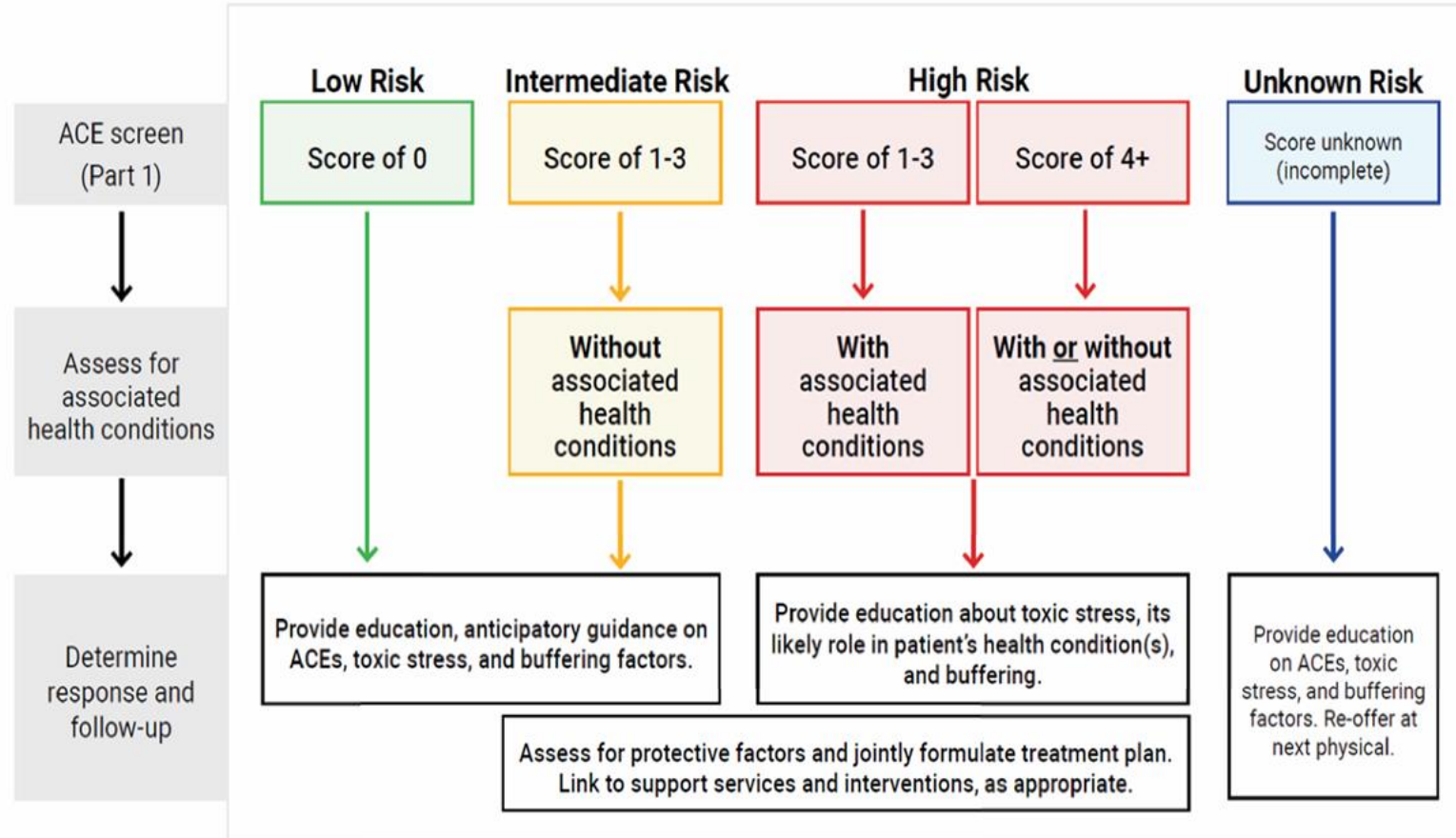
**ACEs Dramatically Increase Risk for
at least 9 of the 10 Leading Causes of Death in the U.S.**

	Leading Causes of Death in the U.S., 2017	Odds Ratios for ≥ 4 ACEs (relative to no ACEs)
1	Heart disease	2.1
2	Cancer	2.3
3	Accidents (unintentional injuries)	2.6
4	Chronic lower respiratory disease	3.1
5	Stroke	2.0
6	Alzheimer's disease or dementia	11.2
7	Diabetes	1.4
8	Influenza and pneumonia	Unknown
9	Kidney disease	1.7
10	Suicide (attempts)	37.5

Source of causes of death: CDC, 2017; Sources of odds ratios: Hughes et al., 2017 for 1, 2, 4, 7, 10; Petrucelli et al., 2019 for 3 (injuries with fracture), 5; Center for Youth Wellness, 2014 for 6 (Alzheimer's or dementia); Center for Youth Wellness, 2014 and Merrick et al., 2019 for 9.

ACEs and Toxic Stress Risk Assessment Algorithm – Pediatrics

Full algorithm is available at: ACEsAware.org/clinical-assessment



****The Body Keeps the Score (Key Points)****

- Trauma affects both the brain and body by altering stress response and memory processing.
- The amygdala becomes hyper-alert, while the frontal lobes struggle to regulate emotional reactions.
- Chronic trauma can lead to physical symptoms such as tension, pain, migraines, and fatigue.
- Mindfulness, yoga, EMDR, and neurofeedback help calm the nervous system and retrain brainwave patterns.
- Supportive relationships play a central role in recovery and restoring a sense of safety and connection.

