



# The Biology and Impacts of Trauma



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# Objectives

- Understand trauma and the different types of trauma
- Understand the impact of trauma on genetic expression and brain development
- Increase knowledge regarding trauma symptoms
- Understand the impact of trauma on the ARC model (attachment, regulation & skill competency)



# Is This Trauma





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# What is Trauma?

Trauma is exposure to death, threatened death, actual or threatened serious injury, actual or threatened sexual violence as follows: – DSM (V)

- Direct
- Witnessing, in person
- Indirectly, by learning someone close was exposed to trauma
- Repeated or extreme indirect exposure to aversive details of the event(s), usually in the course of professional duties
  
- Other diagnostic criteria
  - Intrusive symptoms (re-experiencing)
  - Avoidance
  - Negative alteration in cognitions and mood
  - Alterations in arousal and reactivity



# Types of Trauma

- Acute
- Chronic
- Complex



# Acute Trauma

Acute trauma is a single traumatic event that is limited in time. Examples include:

Serious accidents

Community violence

Natural disasters

Sudden or violent loss of loved one

Physical or sexual assault





# Chronic Trauma

Refers to the experience of **multiple** traumatic events...







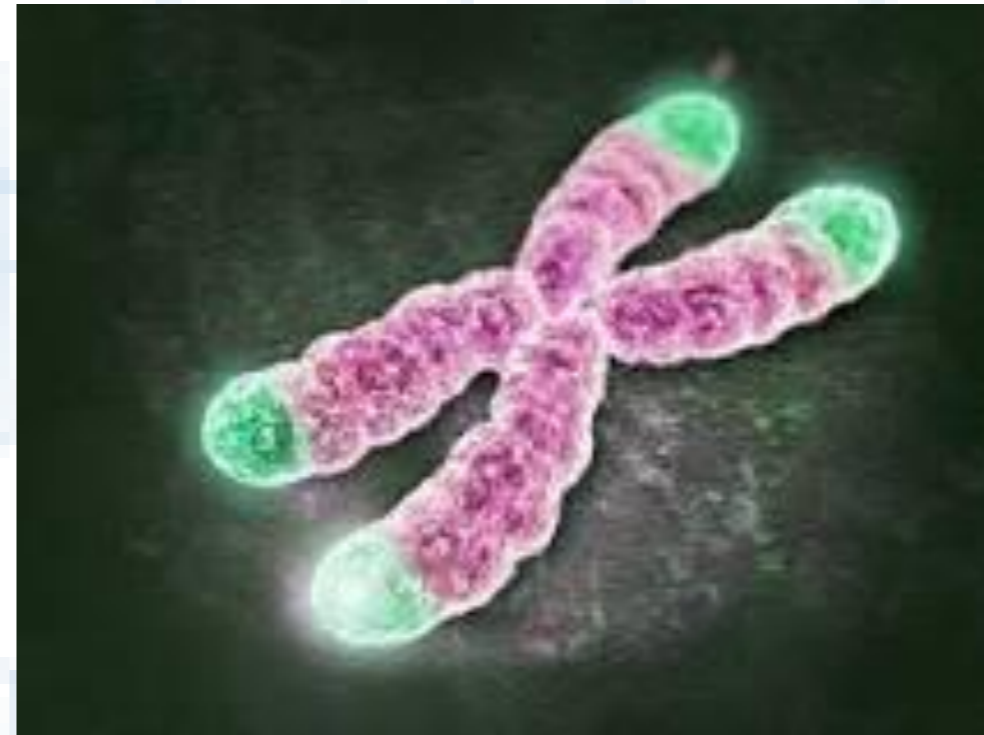
# Trauma and Gene Expression

- Gene Methylation
- Chronic Stress Impact



# Trauma and Cellular Aging

Telomeres





# Trauma and the Immune System

- Microglial Cells
- Lymphatic Brain Pathway

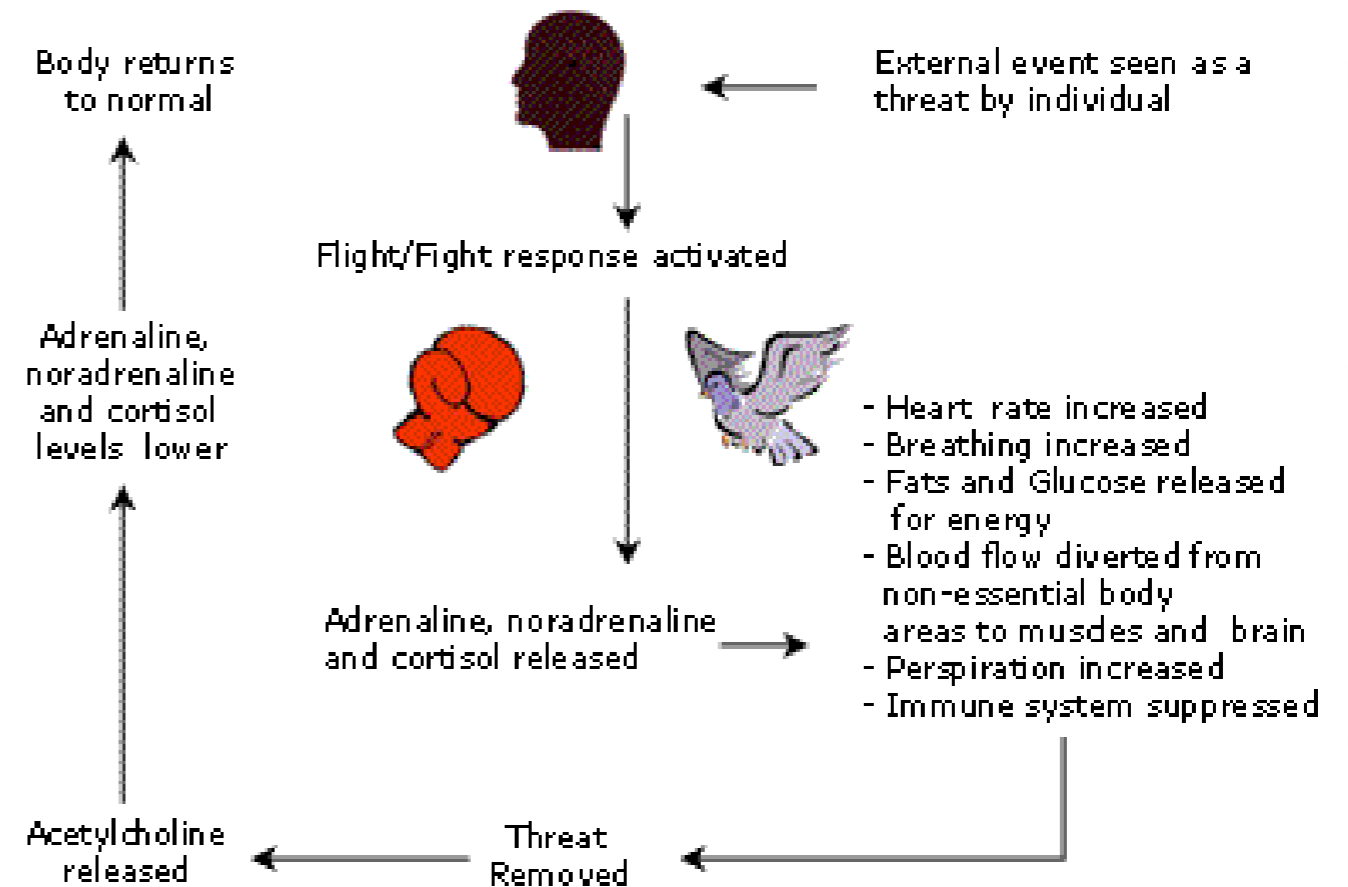




# Trauma and the Stress Response

## Moderated Stress Response

- Sympathetic Nervous System
- Cortisol
- Adrenaline
- Default Mode Network

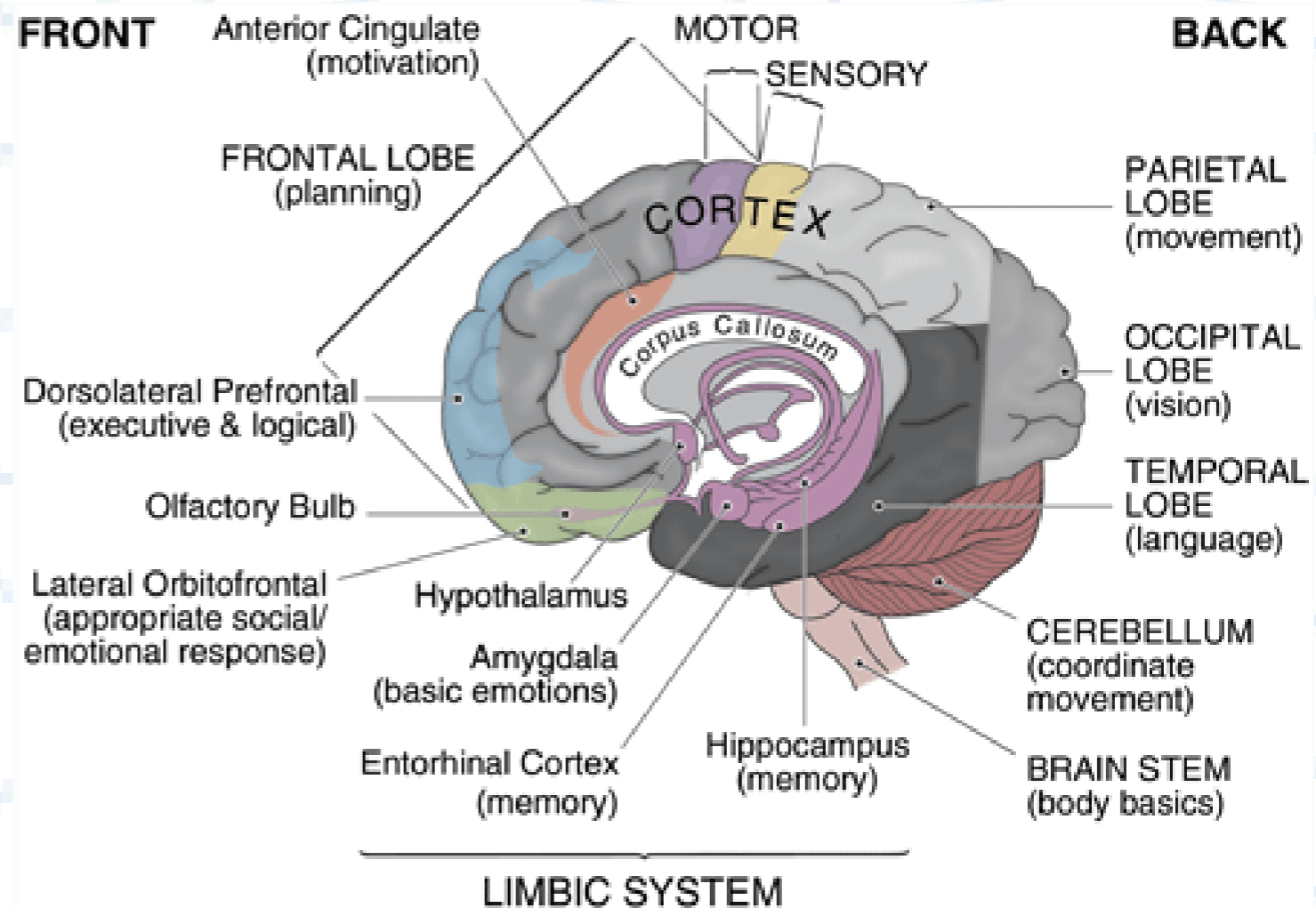




# Trauma and Brain Development

## Changes in Brain Structures

- Amygdala
- Hippocampus
- Corpus Callosum
- Prefrontal Cortex

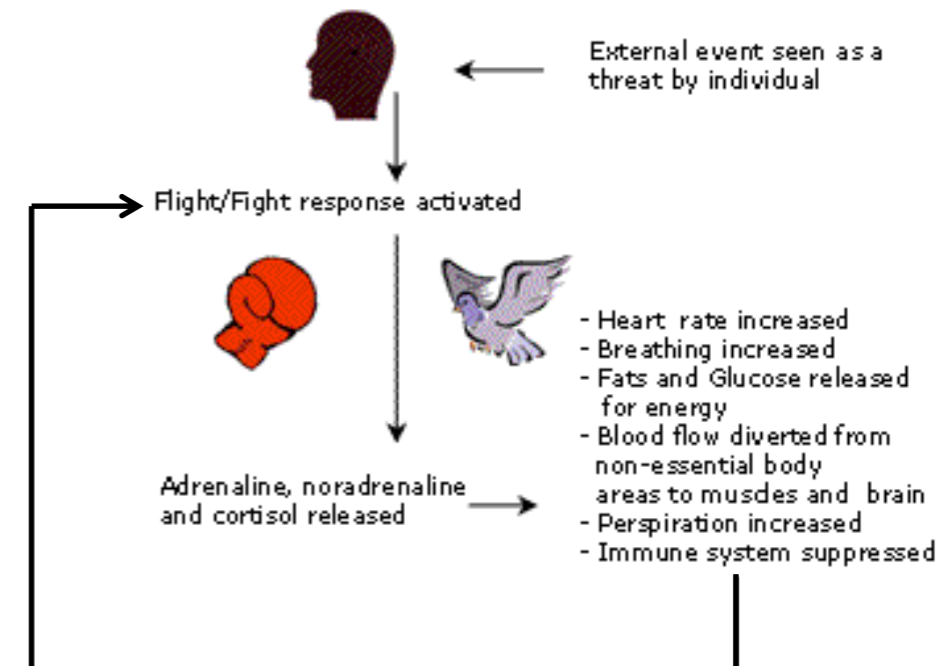




# Trauma and Brain Development

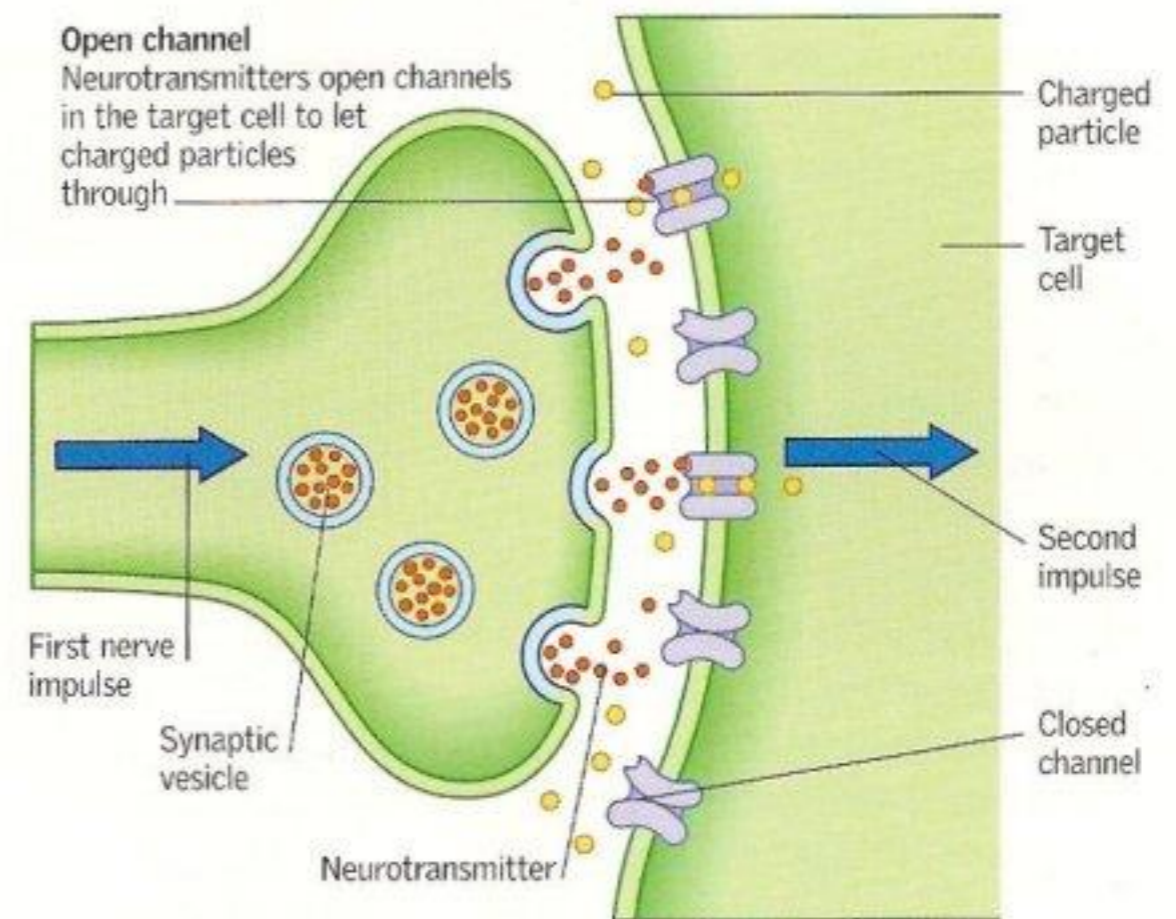
## Changes in Neural Pathways

- Hypersensitive Amygdala
- Hyperactive SNS
- Hypoactive Prefrontal Cortex



## Changes in Neurotransmitters

- Norepinephrine
- Serotonin





# Trauma Symptoms

- Reliving the Experience
- Avoidance and Numbing
- Increase Arousal



# Re-experiencing the Trauma

- Recurrent images and thoughts
- Recurrent and distressing dreams
- Distress at exposure to cues that symbolize the traumatic event
- Physiological reactivity



# Avoidance and Numbing

- Efforts to avoid thoughts and feelings
- Efforts to avoid activities, places or people
- Inability to recall important aspects of the trauma
- Diminished interest in activities
- Feeling detached from others
- Restricted range of affect
- Sense of foreshortened future



# Increased Arousal

- Difficulty falling asleep
- Irritability or outbursts of anger
- Difficulty concentrating
- Hypervigilance
- Exaggerated startle response





# Challenges to Positive Attachment

- Suspicion of others; preoccupied with perceived threat
- Defiant and/or aggressive towards peers, caregivers or adults
- Non-discerning in making friends or sharing information
- Unaware of their own emotions
- Not attuned to others' emotions
- Avoids asking for help or communicating needs
- Needy and demanding behavior
- Allows oneself to be victimized by others
- Isolative behaviors
- Engages in loud attention seeking behavior
- Inappropriate attempts to gain intimate contact



# Challenges to Self-Regulation

- Hypersensitive to physical contact
- Hyper vigilance
- Hyper arousal
- Somatization
- Inability to be mindful
- Disturbances in regulation of bodily functions



# Challenges to Competency

- Pessimistic and hopeless outlook
- Lacking a sense of meaning or purpose in life
- Perceptions of self
  - Low self-efficacy
  - Low self-worth
- Difficulties in the following:
  - Focusing on the task at hand
  - Planning and future-oriented thinking
  - Predicting consequences for one's actions
  - Setting realistic, achievable goals
- Developmental skills deficiencies



# Q & A



Questions or Comments?





# Resources

- The Children's Hospital of Los Angeles, Providing Shelter from the Storm: Trauma-Informed Care
- Dr. Christoph Czermak, Society of Biological Psychiatry 66th Annual Meeting; May 13, 2011; San Francisco, California  
The University of Oklahoma National Resource Center, RHYTTAC, 2011, Train the Trainers
- Hollywood Homeless Youth Partnership, The ARC Framework for Runaway and Homeless Youth Serving Agencies
- Participants in Partnership: Adults and Youth Working Together, New York State Youth Council from the National 4H Council Youth Adult Partnerships Training Curriculum



# Resources

- [Pietrzak RH, et al "Association of posttraumatic stress disorder with reduced in vivo norepinephrine transporter availability in the locus coeruleus" \*JAMA Psychiatry\* 2013; DOI: 10.1001/jamapsychiatry.2013.399.](#)
- Volk, K.T., Guarino, K., Edson Grandin, M., & Clervil, R. (2008). What about You? A Workbook for Those Who Work with Others. The National Center on Family Homelessness.  
<http://508.center4si.com/SelfCareforCareGivers.pdf>