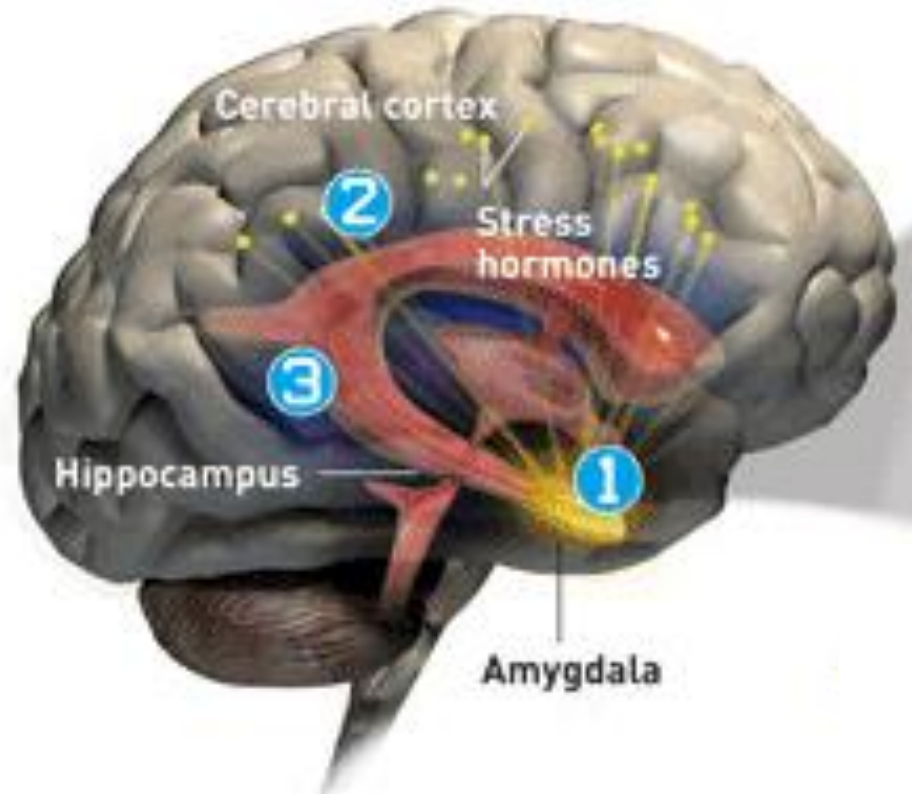


Post Traumatic Stress Disorder



Amy Knight, PhD ABPP-CN
Board Certified Clinical Neuropsychologist
Division Director of Rehabilitation Psychology
Spain Rehabilitation Center
Associate Professor UAB School of Medicine
Department of Physical Medicine and Rehabilitation

Disclosures

I have no financial relationships or affiliations to disclose.

I will not discuss off label use and/or investigational use in my presentation

Objectives

Describe key criteria for the diagnosis of PTSD

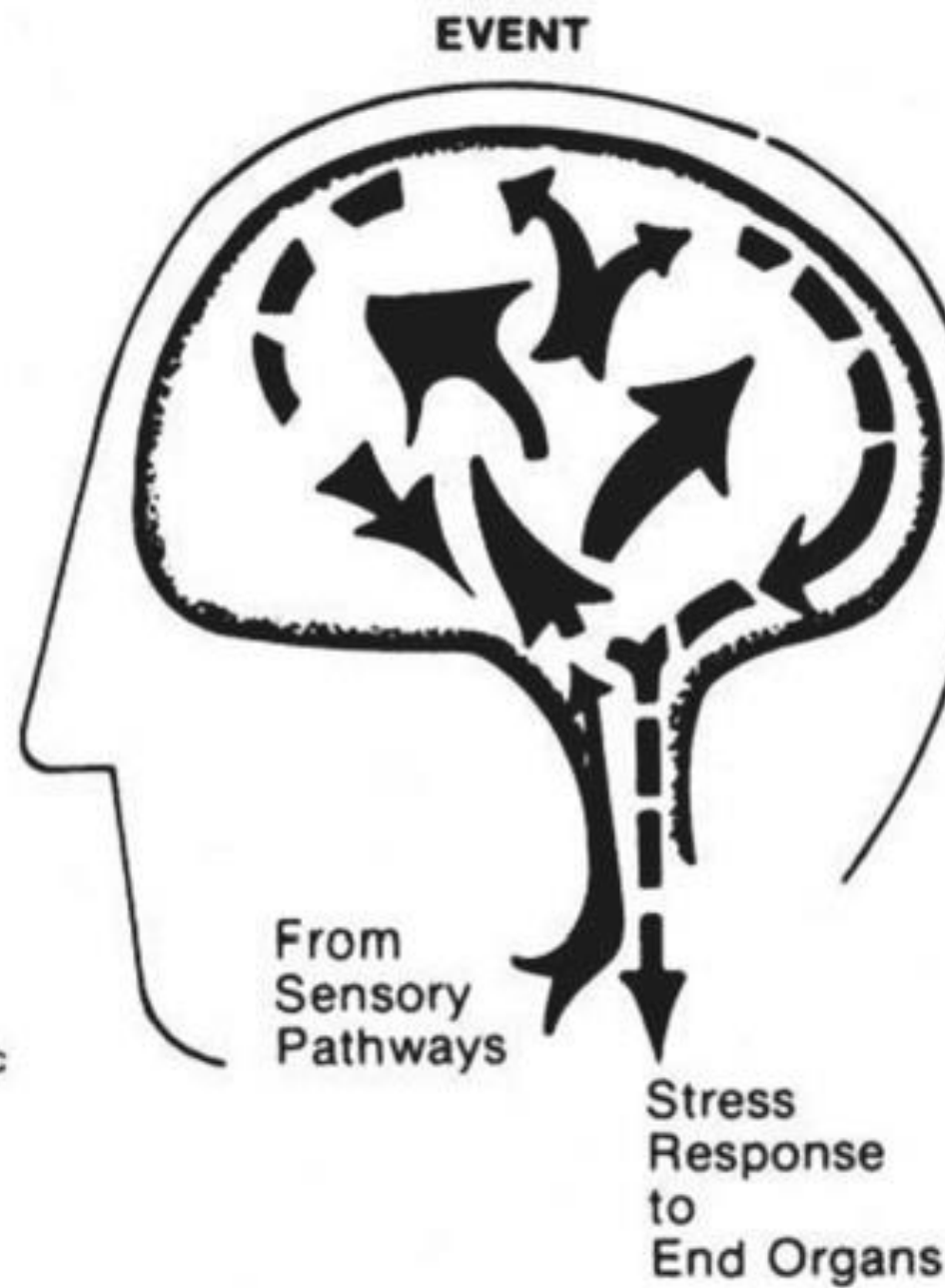
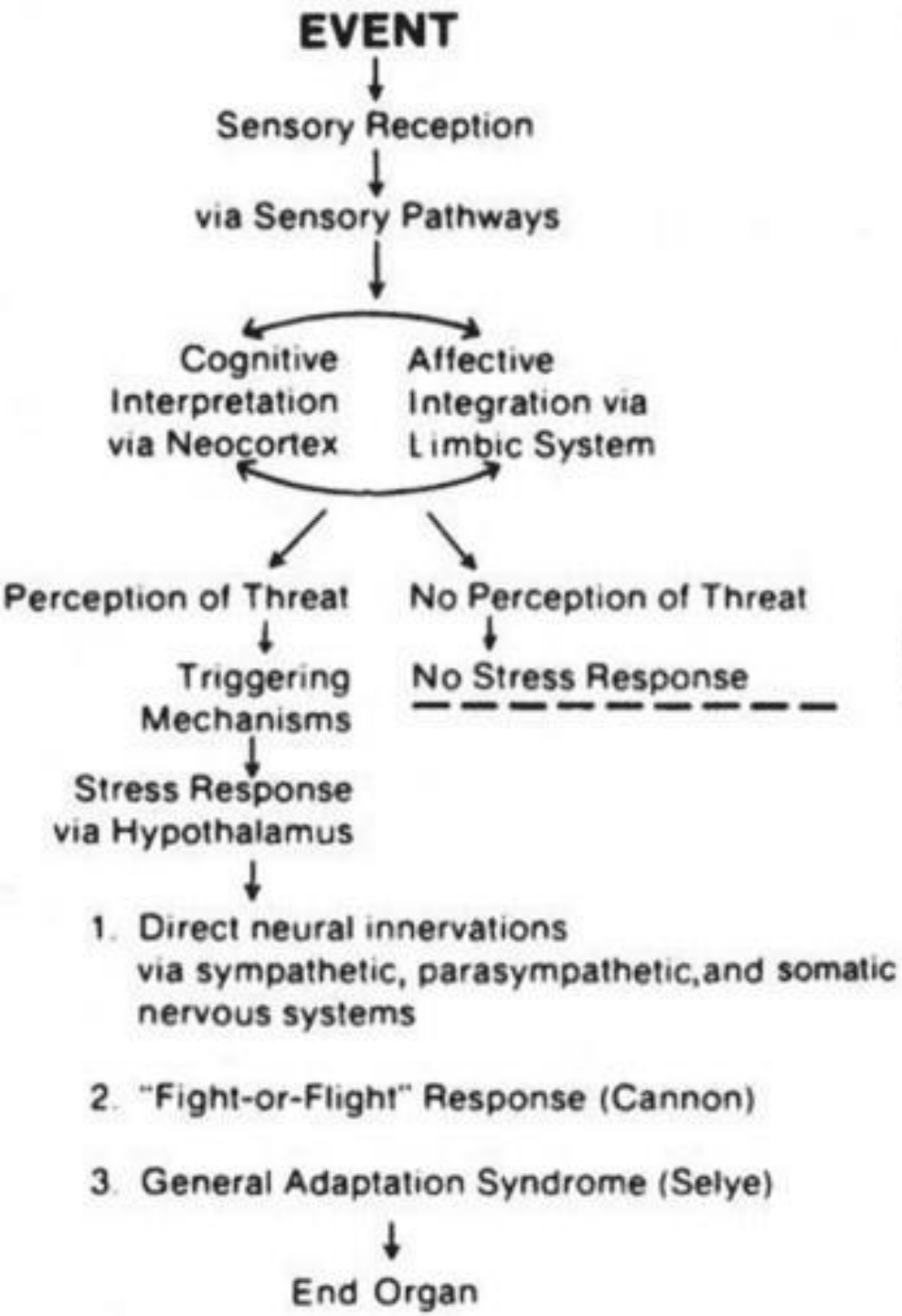
Identify neural circuitry involved in PTSD

Understand psychological and behavioral therapies for PTSD, discussion of Rx agents









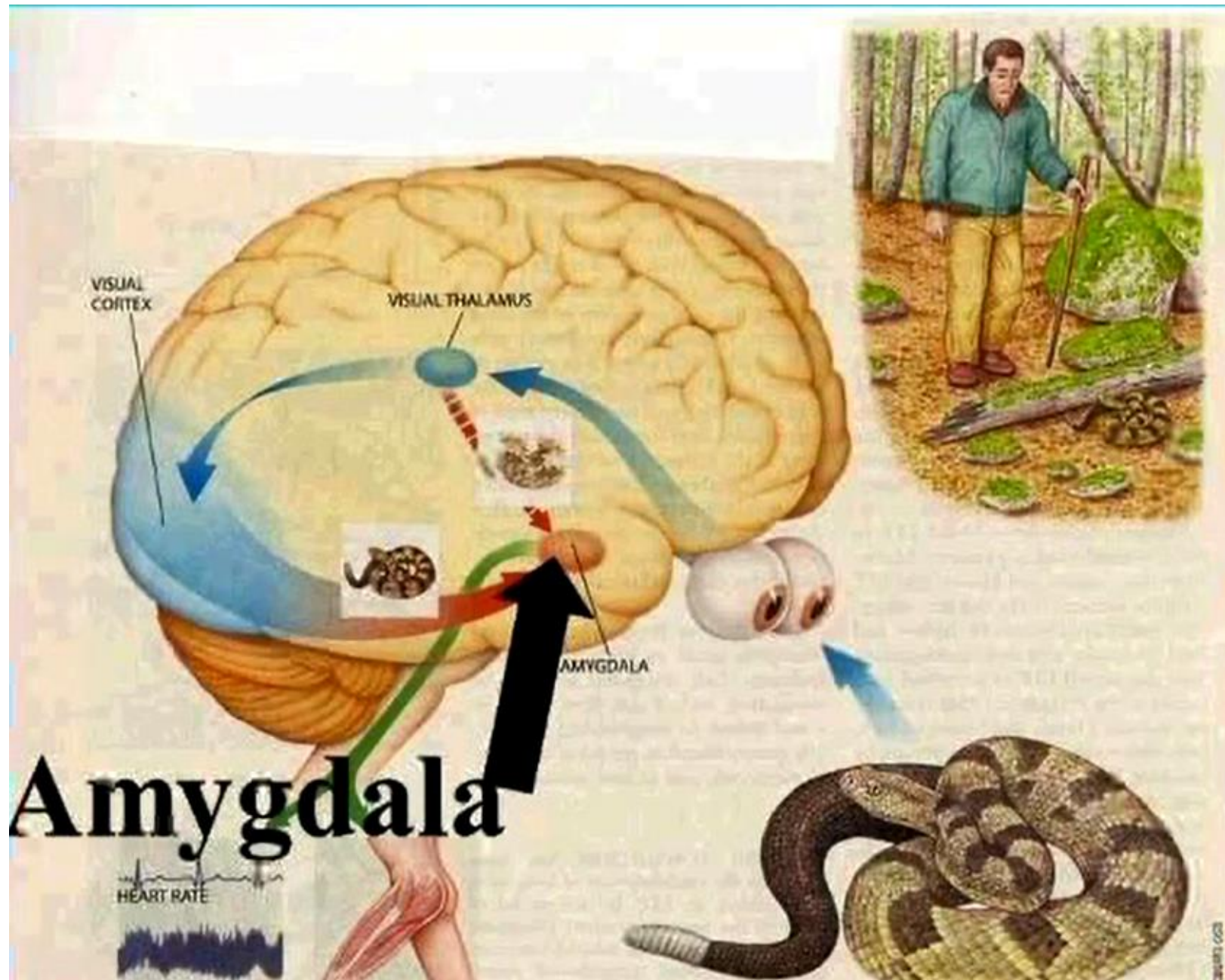


Yerkes-Dodson Law

Human Performance Curve







Fight or Flight Survival Response

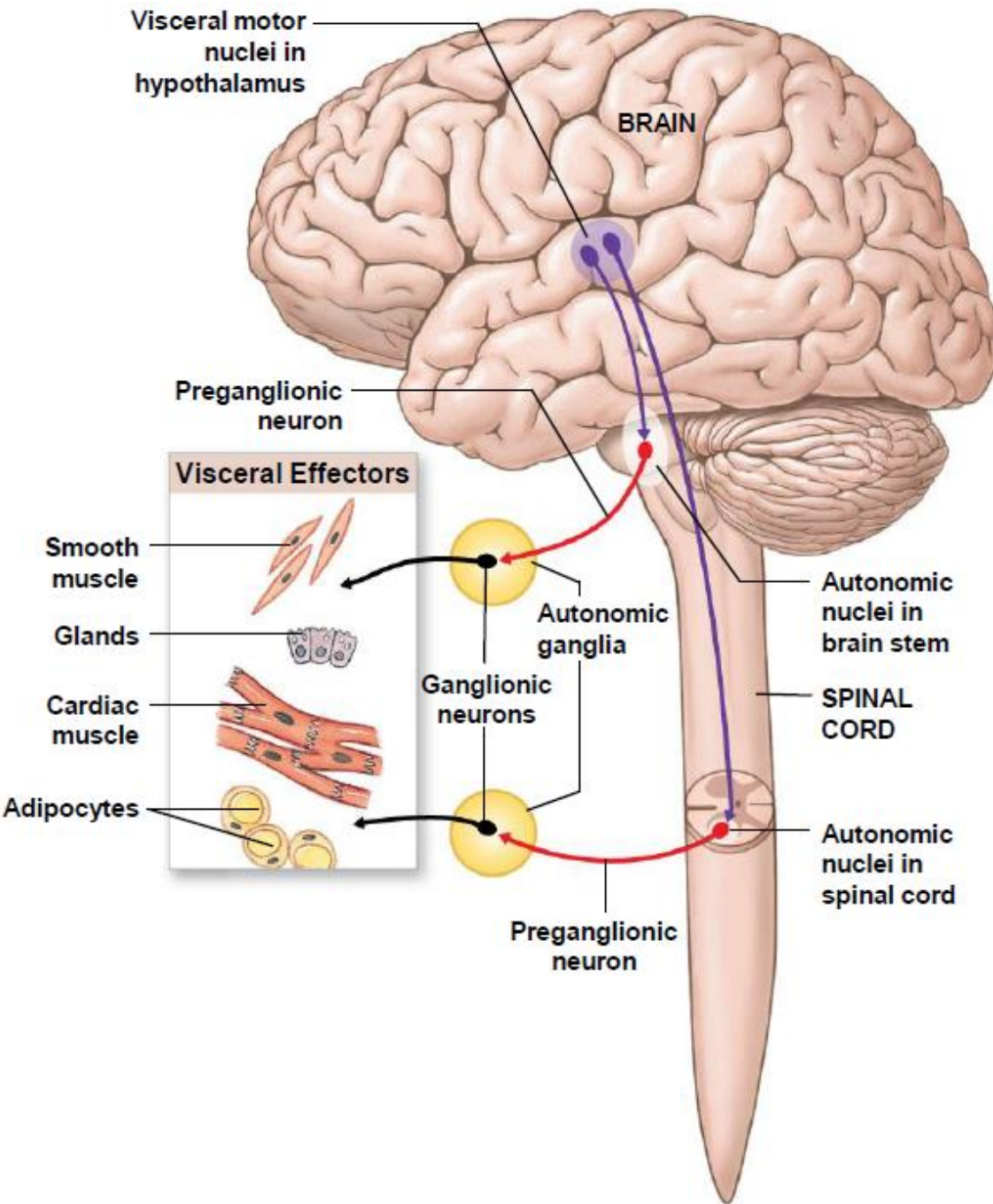
Neurotransmitters start the chain reaction

Noradrenergic system via locus coeruleus

Neurotransmitters are released throughout the brain to increase alertness and vigilance behaviors

Triggers HPA axis and autonomic nervous system which mediates fear-related behaviors

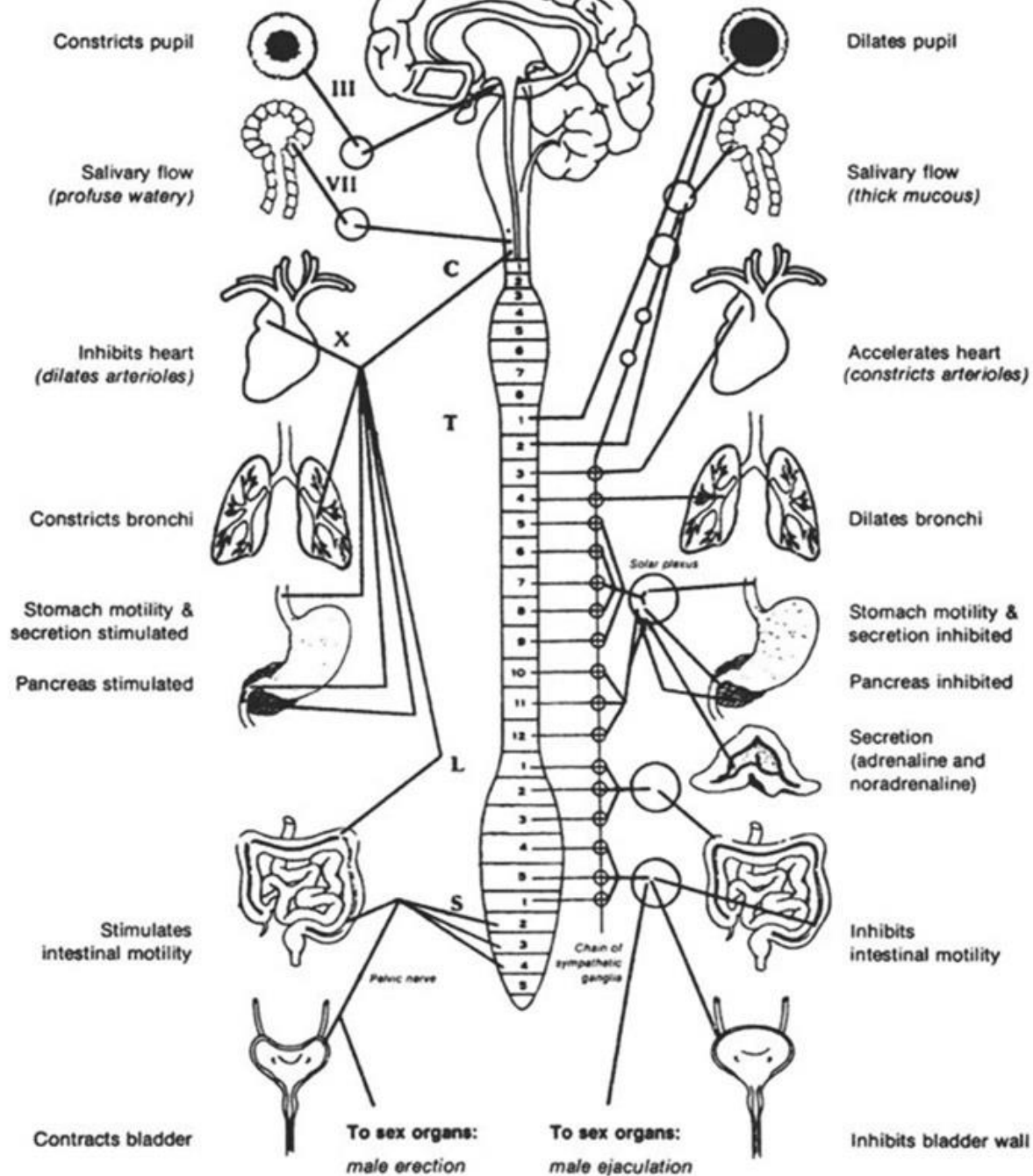
Autonomic Nervous System



- Visceral preganglionic motor neuron in hypothalamus
- CNS controls ganglionic neurons in the periphery
- May lead to excitation or inhibition of the visceral effector innervated

PARASYMPATHETIC EFFERENTS

SYMPATHETIC EFFERENTS



Hypothalamic-Pituitary-Adrenal Axis

Hypothalamus secretes corticotropin-releasing hormone (CRH)

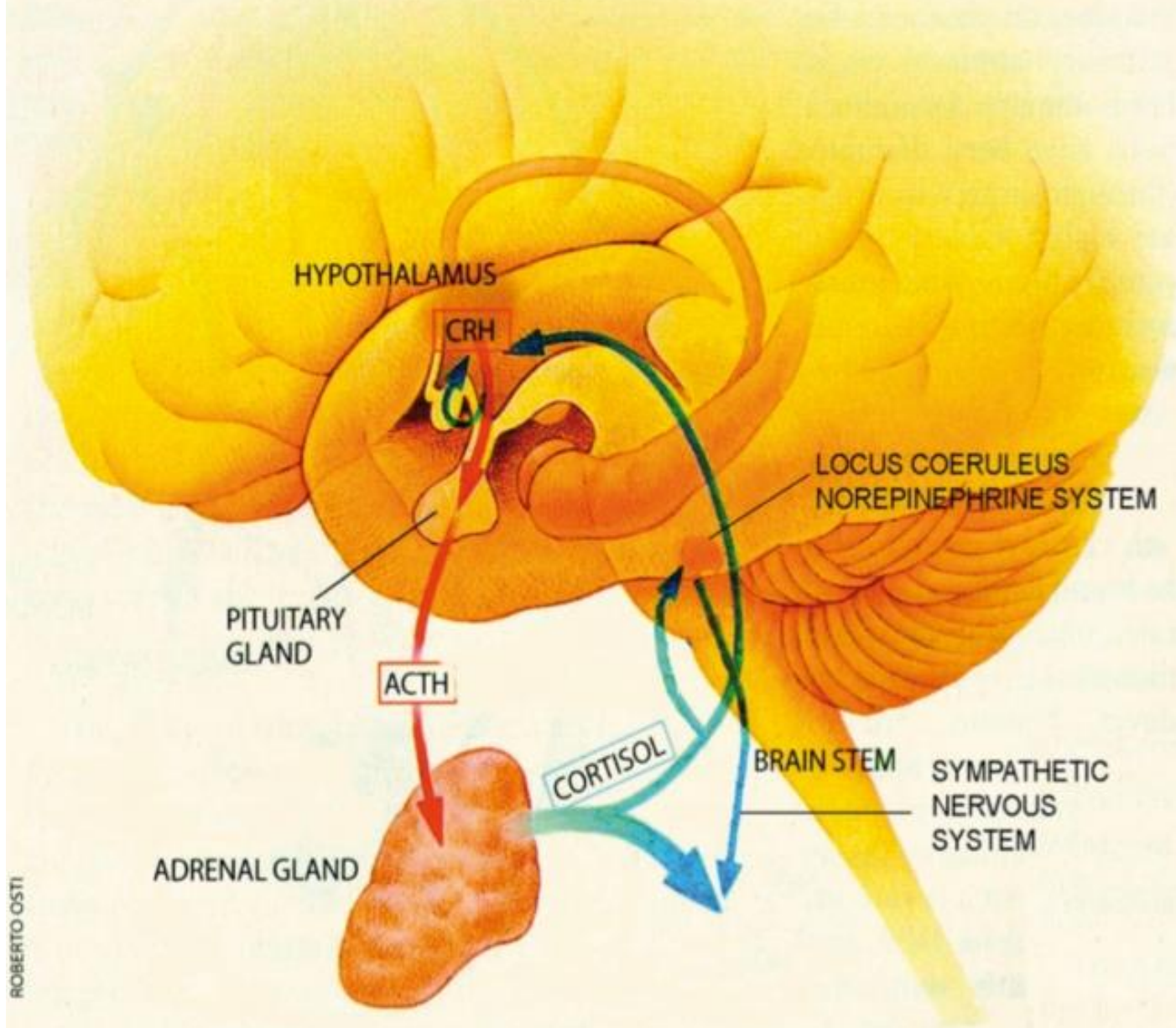
CRH binds to receptors on pituitary cells

Pituitary cells release adrenocorticotropin (ACTH), which is transported to adrenal gland

Adrenal hormones (cortisol) released and activate sympathetic nervous system

Negative feedback system is compromised in PTSD


Hypothalamus-Pituitary-Adrenal (HPA) Axis





Clinical Presentation: PTSD

Diagnostic Criteria

- 
- **Exposure to actual/threatened death, injury, sexual violence**
 - **Intrusion symptoms**
 - **Avoidance behaviors**
 - **Negative thoughts, feelings and behaviors – guilt & shame**
 - **Reactivity – exaggerated startle response, inattention, sleep d/o**

Differential Diagnosis

Acute Stress Disorder

- Up to 1 month after traumatic event
-

Obsessive Compulsive Disorder

- Intrusive thoughts not related to a traumatic event

Major Depressive Disorder

- May be preceded by a traumatic event
- Diagnosed if other symptoms of PTSD are absent (intrusion symptoms, avoidance)

Psychotic Disorders

- Flashbacks vs. hallucinations

Traumatic Brain Injury

- Can occur in context of traumatic event (traumatic accident, bomb blast)
- Headaches, irritability, concentration difficulties present
- Persistent disorientation/confusion rather than re-experiencing/avoidance

Functional Implications

PTSD

Negative emotional functioning

- Increased risk of suicide
- Lack of positive emotions

Reduction in behavioral functioning

- Missing school/work
- Participating in activities

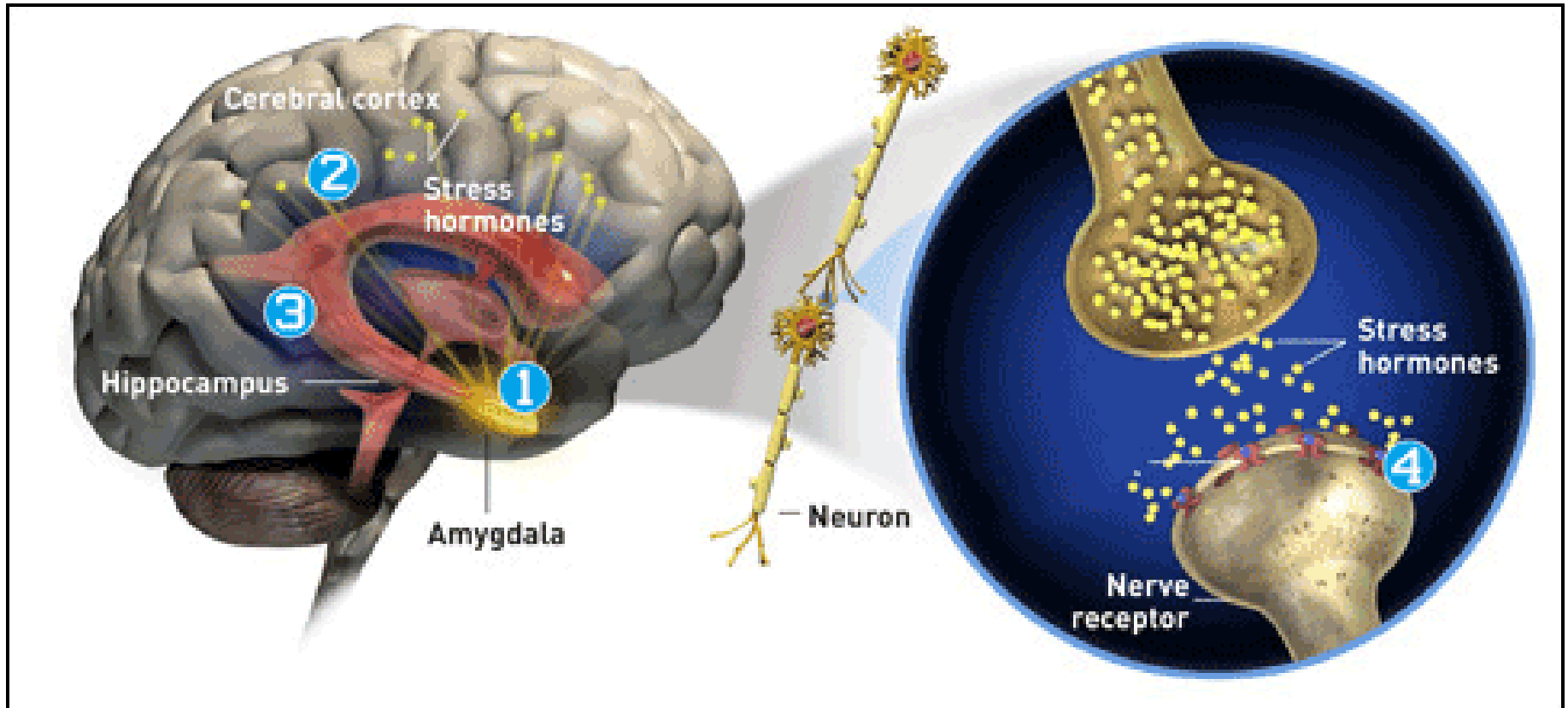
Difficulties and reduction in interpersonal relationships

Cognitive complaints

- Attention
- Memory

Severe sleep disturbance

Lasting effects on neuroendocrine system



Long-term dysregulation of norepinephrine and cortisol systems impact vulnerable areas of the hippocampus, amygdala and prefrontal cortex.

Hippocampus

Prolonged exposure to stress can cause structural abnormalities

- 20% reduction in hippocampal volume in a study of Vietnam veterans with combat-related PTSD
- Police officers with PTSD smaller hippocampus than those without the disorder

Recognizes context in which the traumatic event occurs

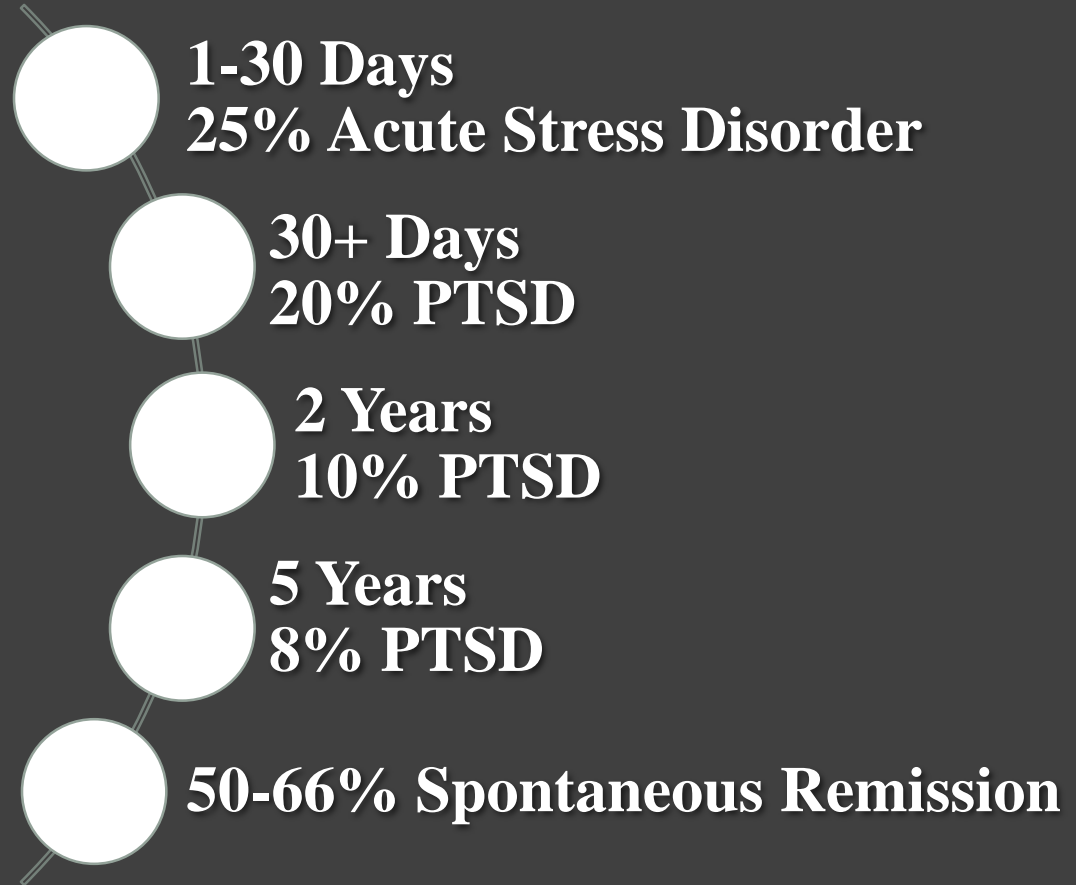
Difficulty discriminating between safe/unsafe environments

Activates amygdala and triggers an emotional response

Hippocampal loss in PTSD

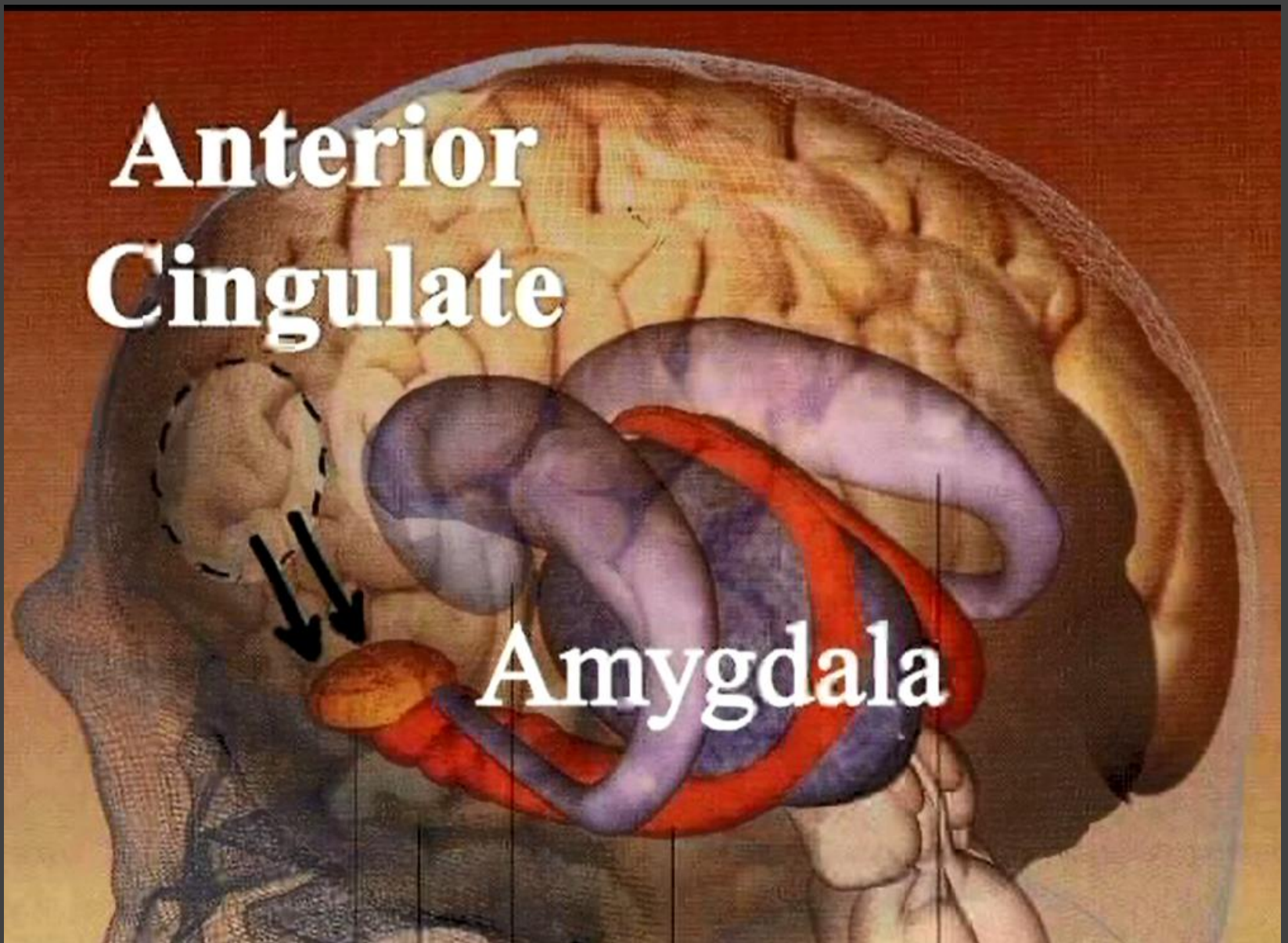


Clinical Course: ASD - PTSD



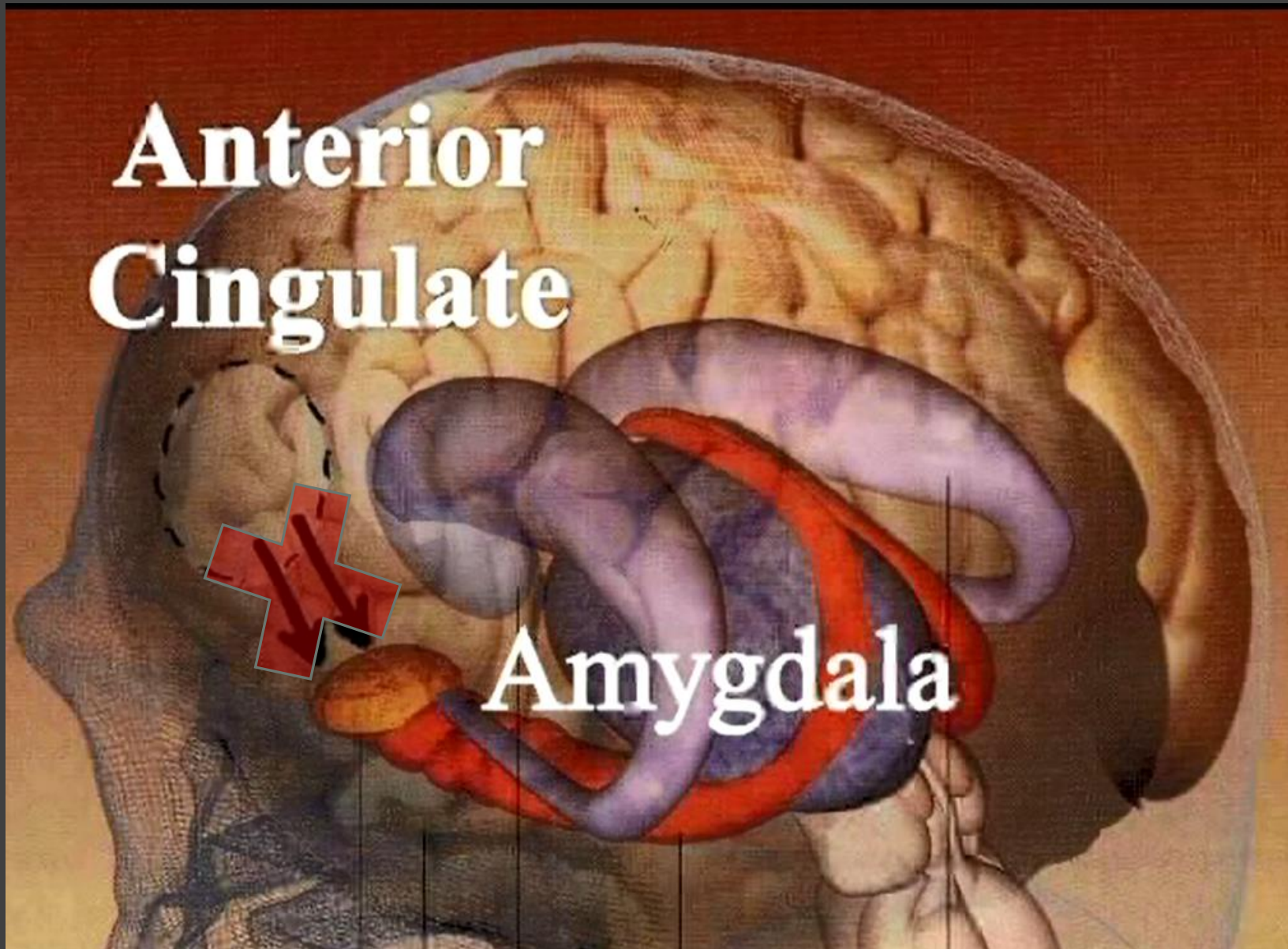
**Anterior
Cingulate**

Amygdala



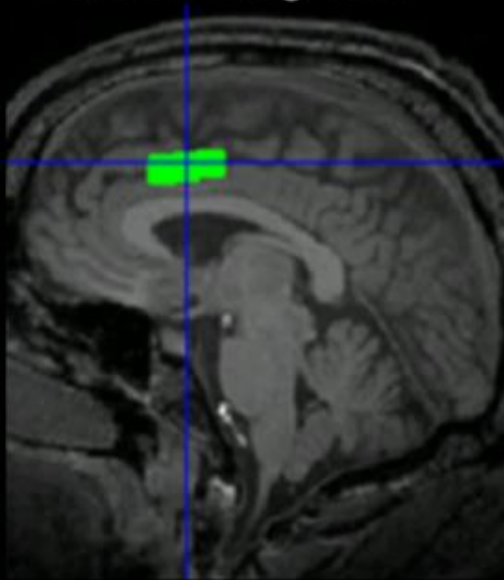
**Anterior
Cingulate**

Amygdala

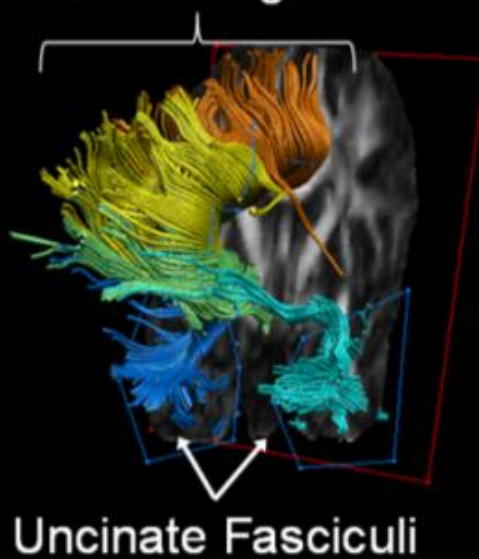


Neuroimaging in Acute Trauma - investigation of pathologic stress response following injury

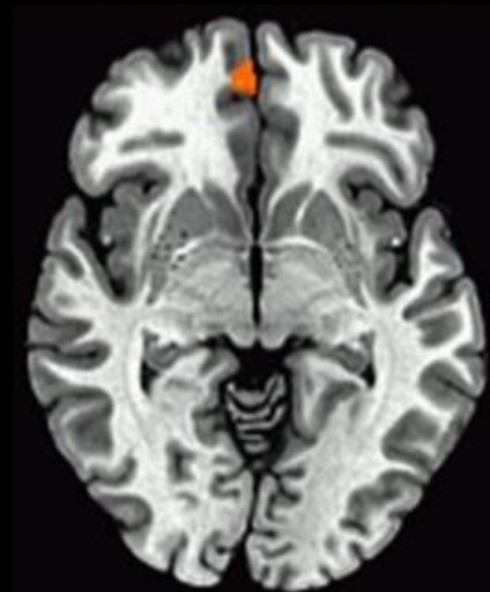
Spectroscopy
Anterior Cingulate



Fractional Anisotropy
Anterior Cingulum



Bold Response
Ventromedial PFC



Funding & Collaborators

Functional Neurorecovery Pilot Grant, UAB PM&R

Faculty Development Grant, UAB Office of the Provost & UASOM

Student Summer Research Program (MSSRP) – UASOM

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Department of Emergency Medicine Research Assistant Program

Co-PI - David C. Knight, PhD (Psychology)

Sherry Melton (Trauma/Surgery)

Martin R. Setliff, MD (PM&R)

Kimberly Wood, PhD (Psychology)

Nathaniel Harnett, BS (Psychology)

Muriah Wheelock, BS (Psychology)

Edward Ference, BS (SOM Summer Research Scholar)

STUDY DESIGN

UAB Hospital Inpatient Trauma Unit (<30 days post trauma)
Symptomatic Acute Stress (n=20)
Non-Symptomatic matched controls (n=20)
MRI Incompatible (n=20)

Baseline: fMRI and physiological (skin conductance, startle EMG, and cortisol), PTSD survey, Psychosocial risk factor scale, CPT attention task, & WTAR for IQ estimate.

3 and 6 months post-trauma: PTSD survey

Exclusion: Significant Axis I disorder including bipolar disorder, schizophrenia, other psychotic disorders, and/or a history of substance abuse, TBI, MRI exclusions (partial).

Stress-Inducing Conditioning Study

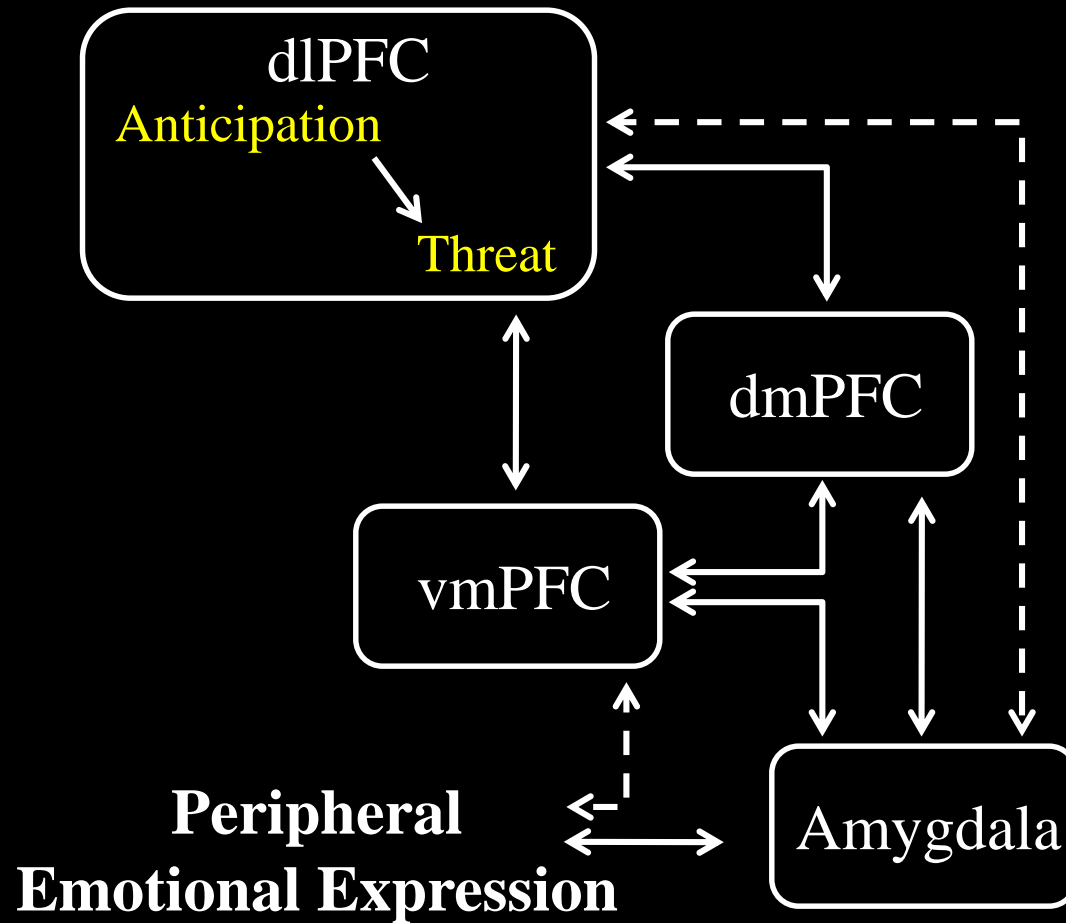
fMRI paradigm measures reactivity to a loud (105dB) white noise in predictable and unpredictable conditions

Participants will rate their expectancy the noise (0-100)

Skin conductance response & startle electromyography - validate imaging data.

Cortisol levels collected by before & after imaging session

Model of Emotion Regulation



Hypothesis

Trauma Exposure

↓ Anticipatory prefrontal cortex (PFC)

↑ Stress-induced amygdala activity.

↑ Physiological stress responses

skin conductance

startle electromyography

cortisol levels)

↑ Acute Stress Disorder symptoms

baseline, 3 months & 6 months post event

Susceptibility to PTSD - reduced PFC / enhanced amygdala

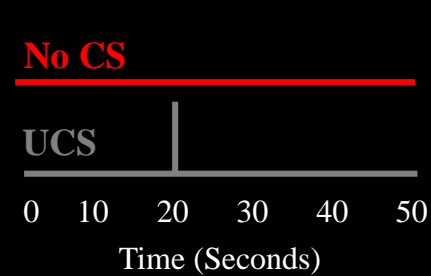
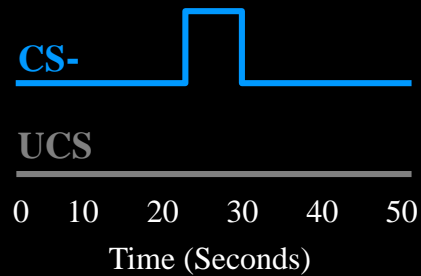
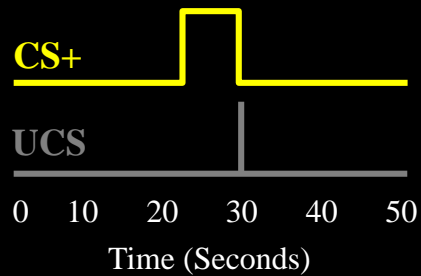
Resilience from PTSD - enhanced PFC / reduced amygdala

Illustration of Experimental Design

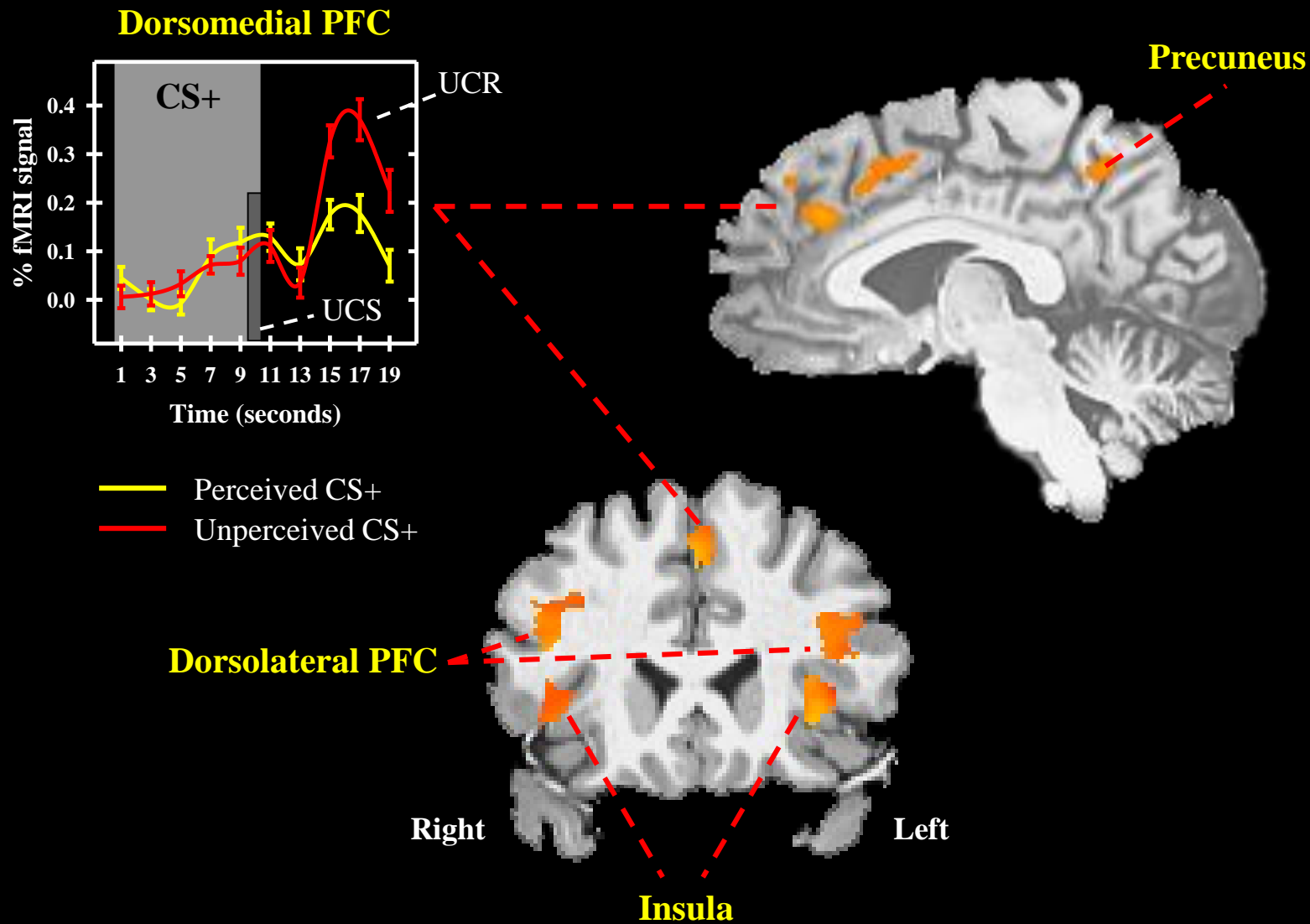
CS = 10 sec

UCS = 0.5 sec

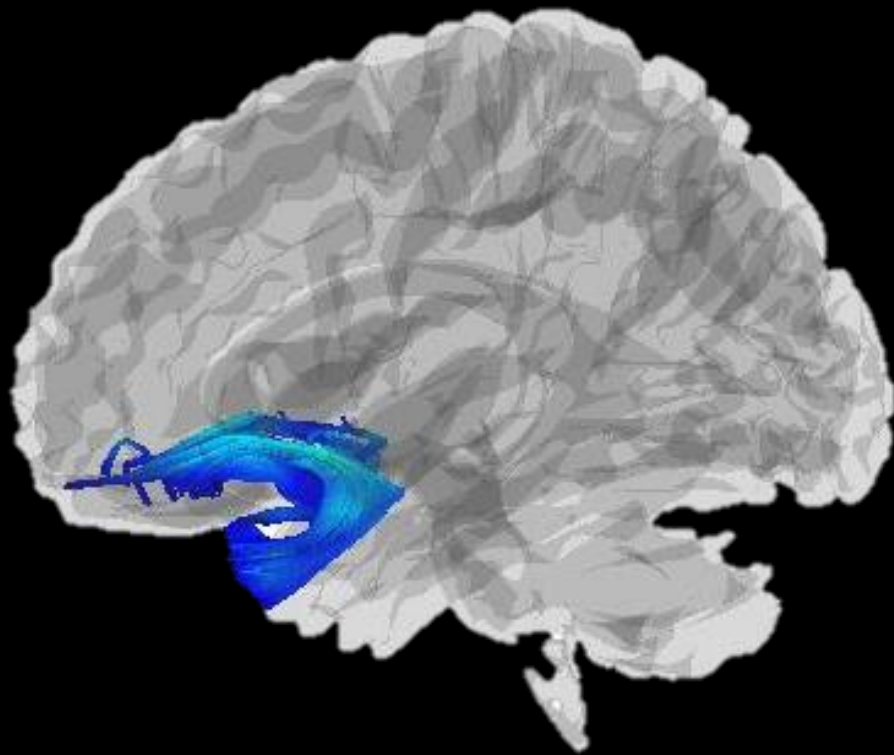
ITI = 20 sec



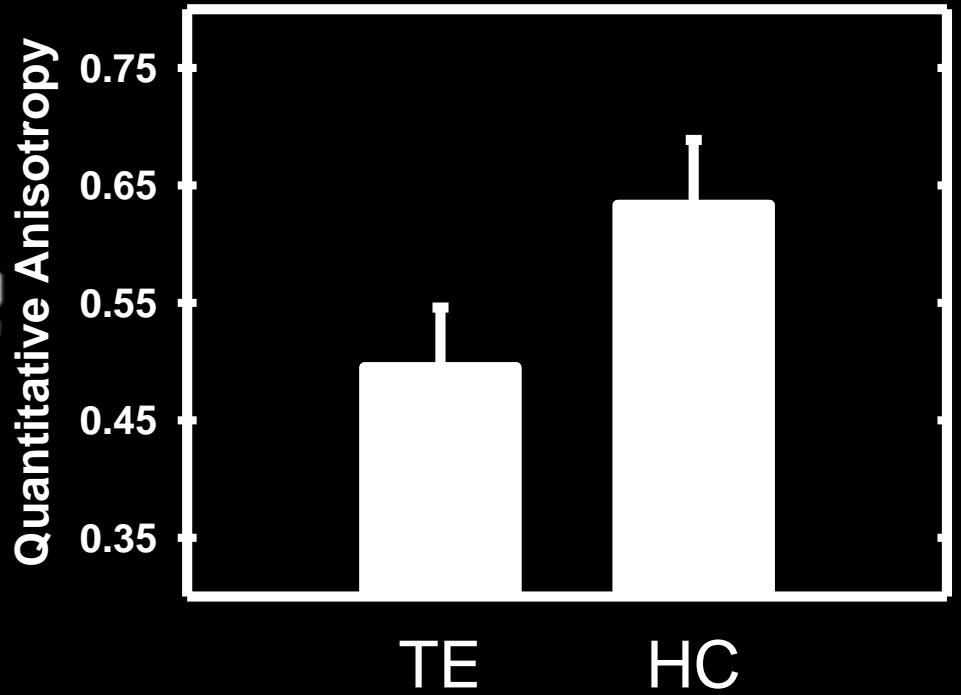
Regions showing UCR Diminution



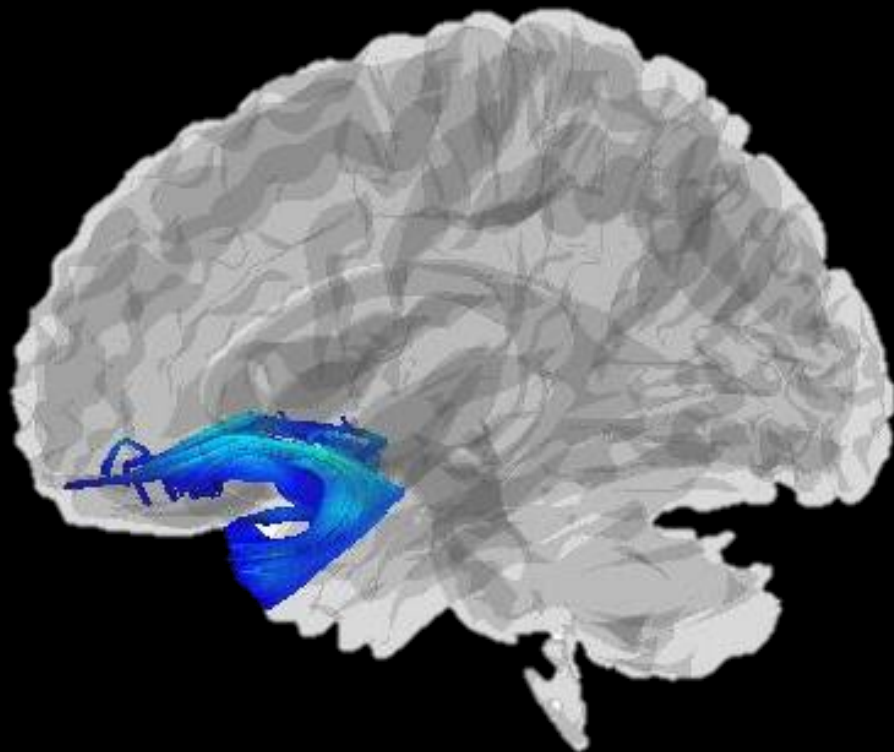
Structure (DTI)



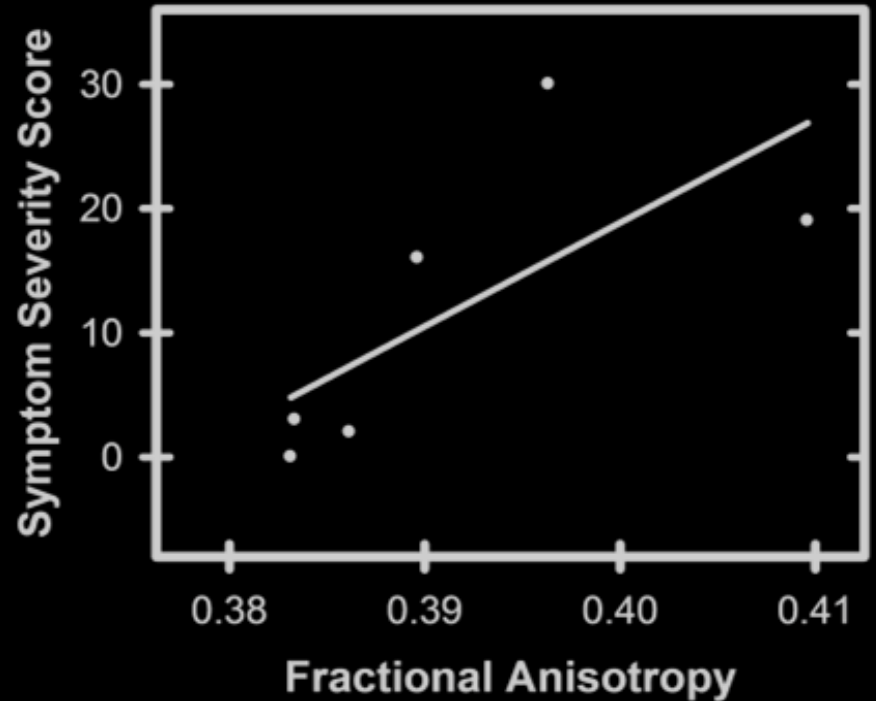
Uncinate Fasciculus



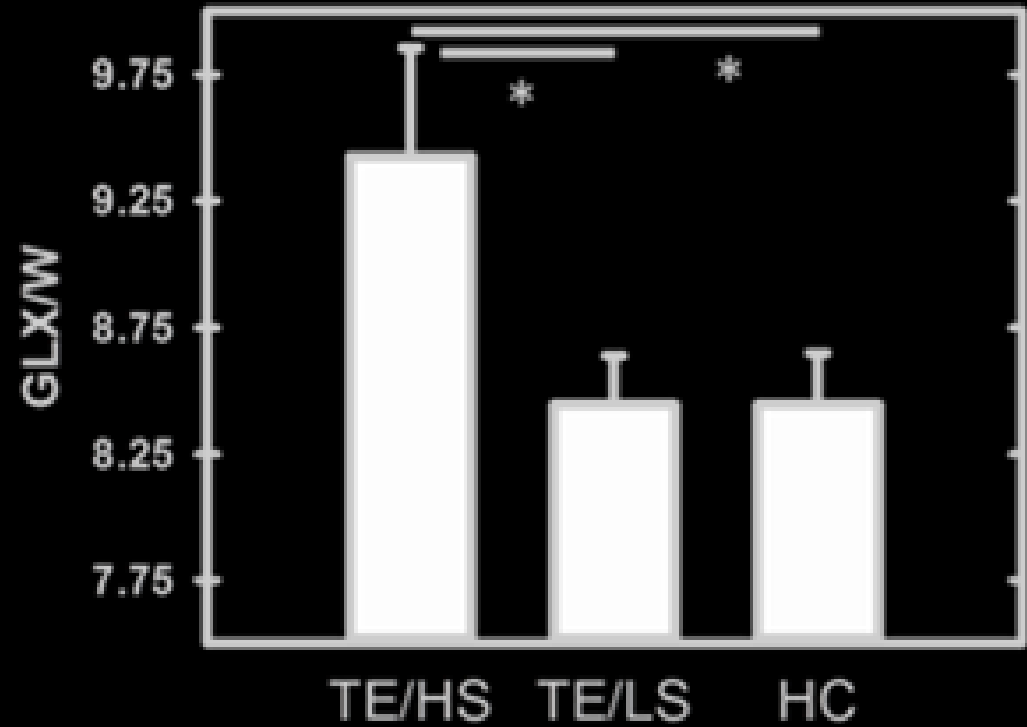
Predict Symptom Severity



Uncinate Fasciculus



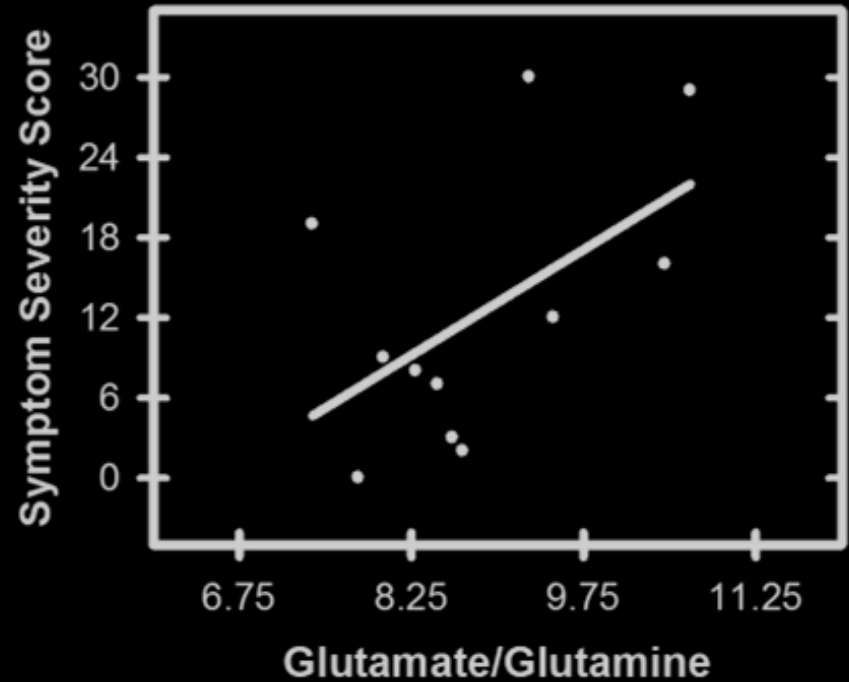
Biochemistry (MRS)



DTI/MRS Predict Symptom Severity

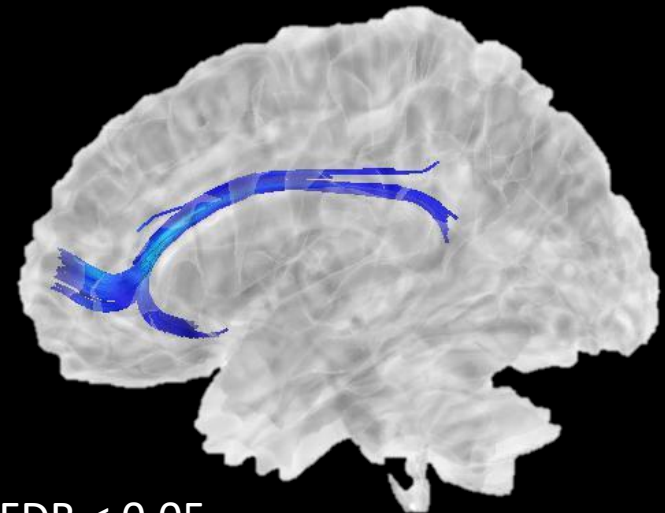
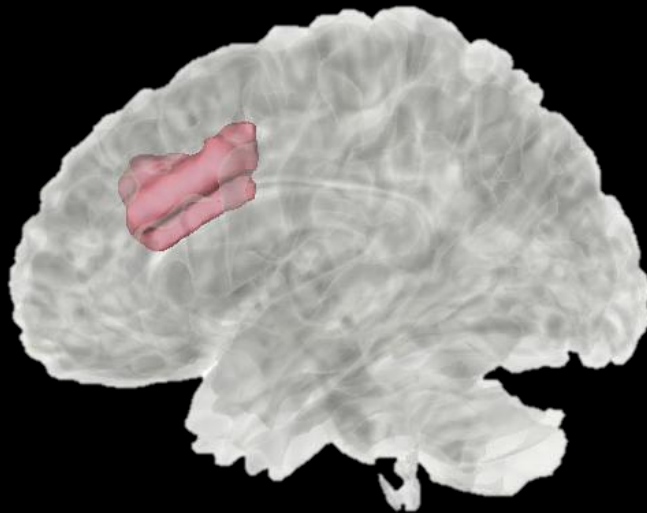


Dorsal ACC



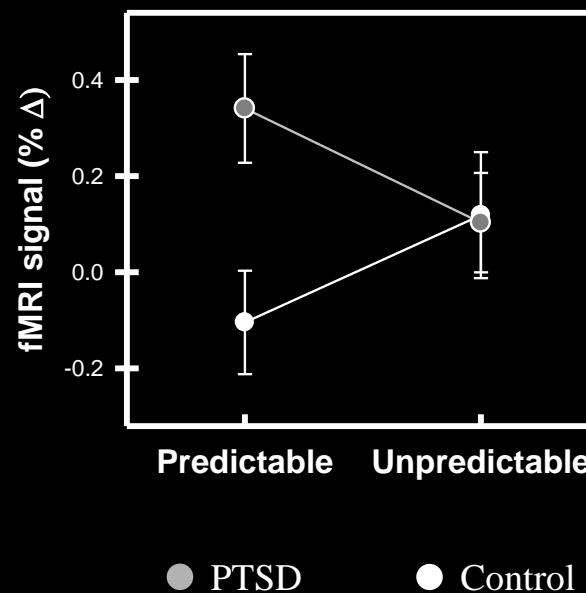
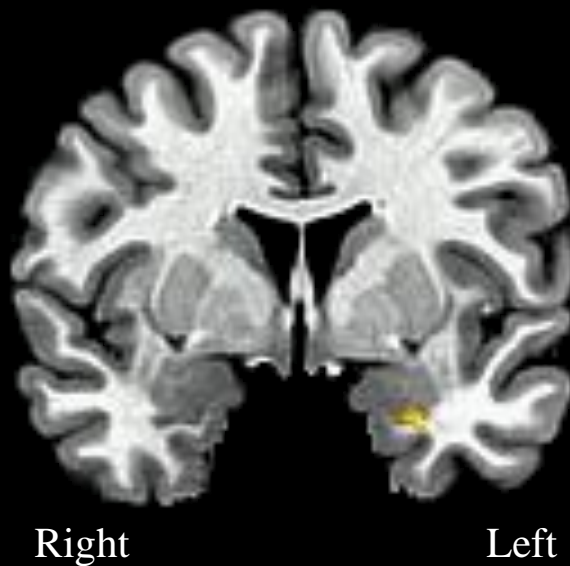
Predict Symptom Severity

Increased post-traumatic symptom severity is associated with decreased quantitative anisotropy within the cingulum



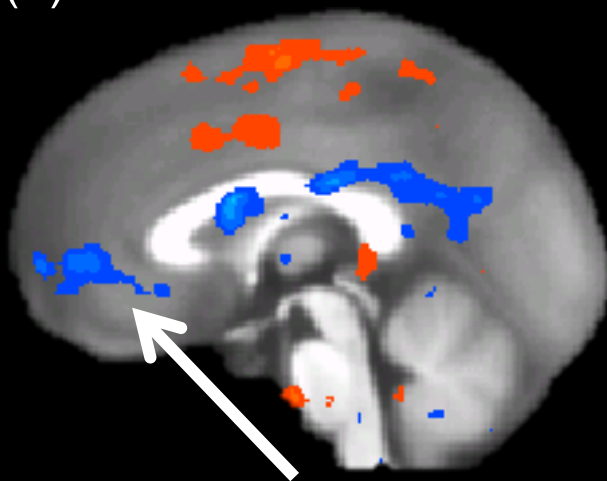
FDR < 0.05

Amygdala, Threat Predictability & PTSD

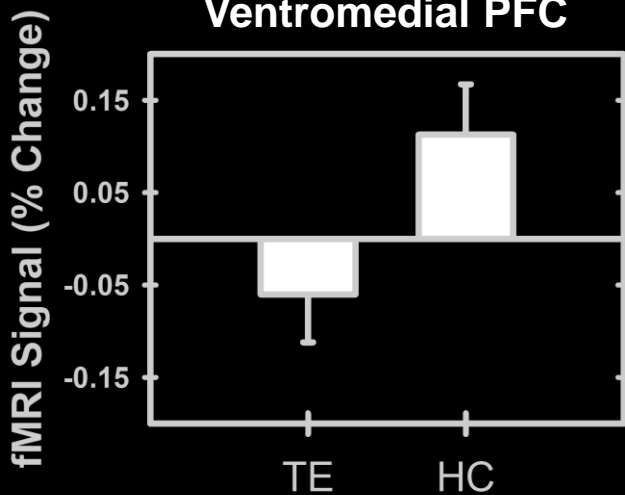


Functional (BOLD)

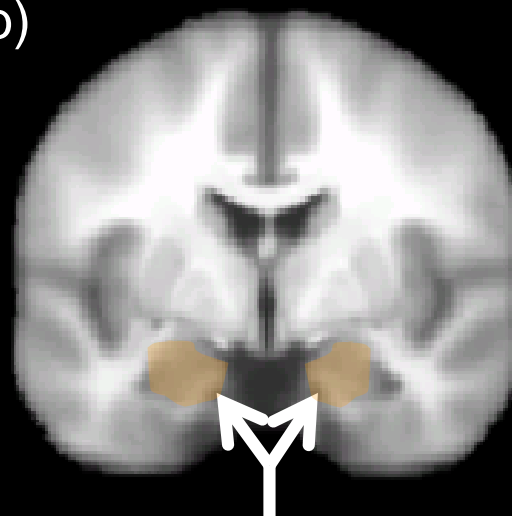
(a)



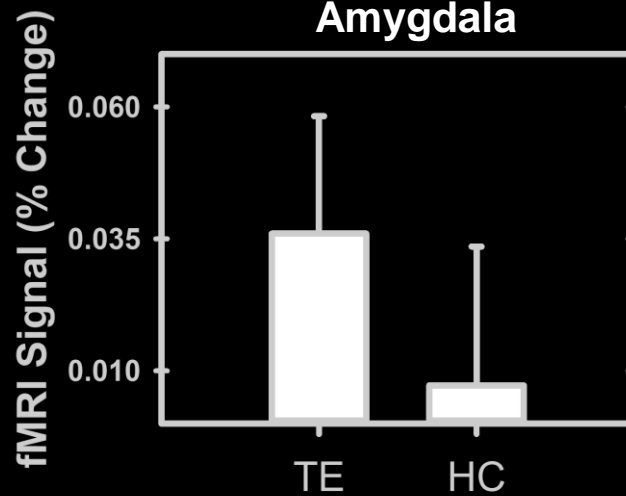
Ventromedial PFC



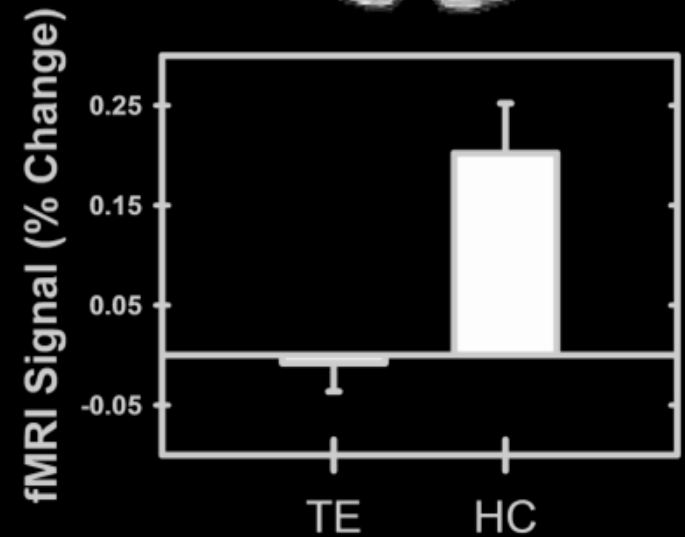
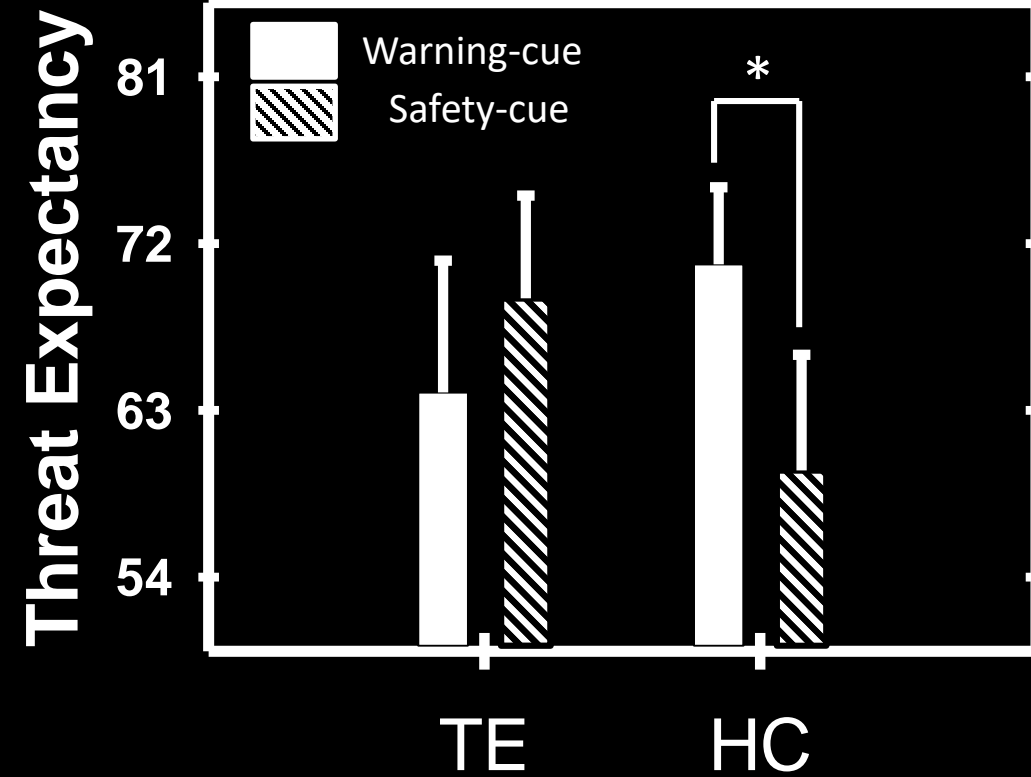
(b)

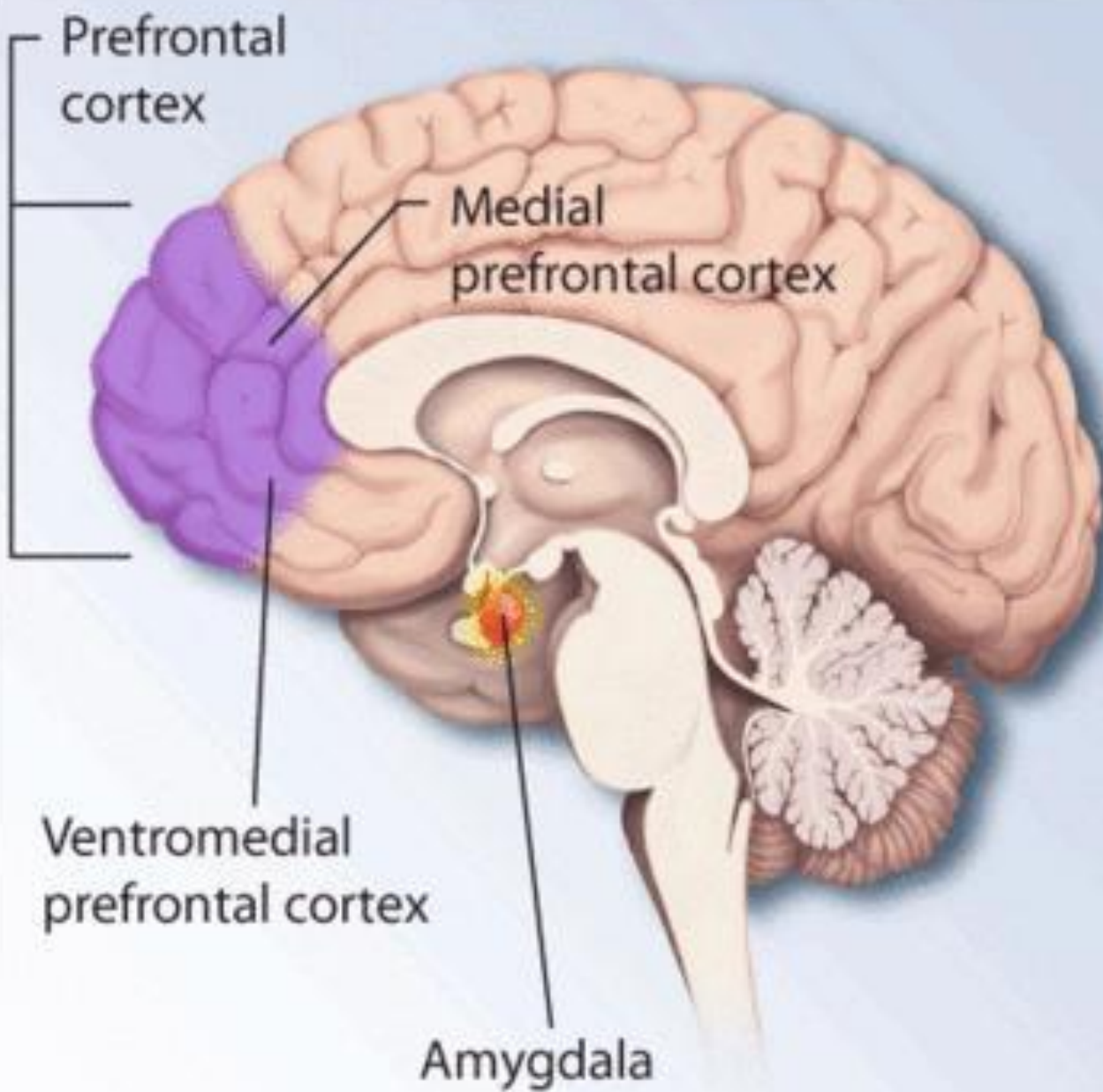


Amygdala



Functional (BOLD)





Post Crisis Strategies

Most people do not benefit from acute crisis counseling

- permission not to talk about it is helpful with friends family coworkers
- Encourage talking about when ready, with trusted inner circle, on your terms

Human contact, comfort, basic needs and security

Early education on normal acute stress symptoms

- Sx to expect, intrusive thoughts, nightmares, reactivity

Emphasize natural recovery 3-6 months, gradually improving

Stay active, watch for avoidance behaviors, don't make it worse

- **Social withdrawal, substance use, alcohol, recklessness, tranquilizers**

Psychopharmacology

Pharmacological treatment

- **SSRIs – first line (FDA: fluoxetine, sertraline)**
- **Antihypertensive medications**
- **Specific sleep aid to help with disruptive nightmares (prazosin)**



Anxiolytic medications – contraindicated
No benzos! Worse outcomes, dependency, abuse

Cardiologist Dr. Christy Huff

“A Xanax prescription that should have been rejected”

Writes about the things she wishes she had known

- Benzodiazepines can establish physical dependence in a matter of days or weeks - in the absence of abuse or addiction.
- Withdrawal symptoms can be intolerable and disabling in spite of a very slow taper
- Benzodiazepine adverse effects, tolerance, and withdrawal can create a myriad of symptoms

MEDPAGE TODAY'S

KevinMD.com

Social media's leading physician voice



Side Effects from Benzodiazepine Use

Achiness
Aching jaw
Aching joints
Aching muscles
Acute hyperexcited state
Aggressive behaviour
Agitation
Agitated sight
Agoraphobia
Air Hunger
Akathisia
Allergic reactions
Allergic reactions to/Intolerance of foods previously tolerated
Allergy & nasal symptoms exacerbated
Anger
Anhedonia
Anorgasmia
Anxiety
Apathy
Appetite – either loss of or voracious appetite with constant desire to eat
Arms and legs feel detached from body
Ataxia
Band around head
Bladder Incontinence
Bleeding between menstrual cycles
Bleeding from the nose
Blepharospasm
Blood Pressure Issues (High or Low)
Blurred Vision
Body Temperature Fluctuations
Brain Fog
Body odor
Bradycardia
Brain moving within the skull sensation
Breasts (heavy over-sensitive swollen enlarged painful)
Breathing difficulties
Breathlessness
Bruzism

Buildings appear to be leaning
Burning along the spine
Burning Sensations on Skin
Buzzing, burning, tingling limbs
Changes in perception (faces distorting and inanimate objects moving)
Changes in skin color, tone, texture
Chemical Sensitivities
Chest tightness
Chills
Choking
Claustrophobia
Clumsiness
Cognitive impairment
Confusion
Constipation
Cracked and sore lips
Cramping in stomach
Cramping of the muscles
Craving for sweets and sugary foods
Crying Spells
Cuts and abrasions taking weeks to heal
Dark circles under eyes
Decaying teeth and gums
Dehydration
Delirium
Demented and murderous thoughts
Dental Pain
Depersonalization
Depression
Diarrhea
Difficulty swallowing
Disorientation
Dizziness
Double Vision
Dry Retching
Dry throat, sore tongue, and thrush
Dyspnea
Dysphagia (difficulty eating or swallowing)
Dysphoria (inability to feel pleasure or happiness)
Dyspnea (breathing difficulty)

Dystonia
Earache and sinus problems
Edema
Electronic Zaps
Emotional Blunting
Epileptic Fits
Esophageal Spasms
Esophagitis
Excitability
Exhaustion
Extreme cold
Extreme thirst
Eyes – sore, tired, seeing floaters, spots, itchy, red
Eye Dryness
Facial Numbness
Fear (terror)
Feces (abnormal looking)
Feeling of extreme heat or cold
Feeling of impending doom
Feelings of shaking inside and out
Feeling of shame
Feelings of unreality
Feelings of worms under scalp
Female ejaculation or incontinence during orgasm
Fingernail problems – median nail dystrophy (line/ridge down the centre), ridges
Flashbacks
Fluctuations in blood pressure
Flu-like symptoms (“Benzo flu”)
Flushing
Formication
Fuzzy feeling in head
Gait Abnormality
Gastritis
Glassy eyes
Goosebumps – very visible to the eye
Grinding teeth
Hair Changes (loss, thinning, dullness)
Hallucinations
Headaches
Heartburn

Side Effects from Benzodiazepine Use

Heavy arms and legs
Hemorrhoids
Holding onto the walls in the shower
Hypersensitive Senses
Heart Palpitations
Hormonal Imbalances
Hot Flashes
Hurts to wear clothes, a car seatbelt
Hypersensitive (unable to watch the news, see films, read the newspaper) Hyperactivity
Hyperacusis (profound hearing sensitivity, hurts to talk on the phone, music, etc.)
Hypersomnia (sensitive sense of smell)
Hyperreflexia ('jumpy') Hypersensitivity to being touched
Hypersensitivity to light, sound, and other stimuli
Hypersensitivity to stress
Hypertension (elevated blood pressure)
Hyperventilation (over breathing)
Hypnologic (hallucinations, sleepwalking)
Hysterical and inappropriate laughter
IBS – irritable bowel syndrome
Impacted bowels
Impairment of motor coordination Impotence
Inability to comprehend the simplest things
Inability to concentrate
Inability to cope with a lot of information Inability to draw a satisfying breath
Inability to make a decision
Inability to read or write
Incontinence, frequent or urgent need to urinate, unable to hold or pass urine Increased saliva
Indigestion
Insomnia
Intense fuzzy feeling in the head
Intense jaw pain
Intrusive Thoughts
Iris in eyes changes color
Irrational rage
Irrationality (in general) Irritability
Jaundice

Jaw, tooth, neck and shoulder aches and pains
Jaw tension, clenching, teeth grinding
“Jelly Legs” – weakness in the legs
Jerks in arms, legs, fingers
Joint aches and pains Joylessness, Jumpy
Lack of concentration Lack of coordination
Left/Right-sided symptoms
Legs, arms and head very heavy Leukonychia (whitening of nails)
Libidinal changes – variances in sex drive
Loss of balance
Loss of concentration
Loss of confidence
Loss of control of movement
Loss of interest in people and/or things Loss of memory (short and/or long-term)
Loss of self respect
Loss of taste or metallic taste (or other strange tastes)
Loss or changes in appetite
Lung pain
Memory Problems
Menstrual Problems
Metallic Taste
Mood swings
Muscle aches
Muscle spasms
Muscle weakness
Nausea
Nervousness
Nightmares
Night sweats
Numbness/Tingling
Obsessions and obsessive behavior
Orgasm changes
Outbursts of aggression and rage
Pain
Painful scalp
Panic Attacks
Paraesthesia
Paranoia

Paraesthesia
Perception Distortion
Passing gas continually
Phobias
Post-Traumatic Stress symptoms
Postural orthostatic tachycardia syndrome (POTS)
Premature menopause
Psychotic symptoms
Racing Thoughts
Rapid blinking of the eyes
Rapid weight loss
Rashes on skin
Reading/Comprehension Problems
Repetitive Thoughts
Restless Legs
Scalp Pain
Shivering
Sinusitis
Speech difficulties
Swallowing difficulties
Tachycardia
Teeth Pain
Thyroid disturbances
Ticking
Tinnitus
Toxic naps
Tremor
Twitching
Urinary Problems
Vertigo
Visual disturbances – waves, sparks, flashes of light, seeing spots, floaters, blurry
Vomiting
Weakness
Weight Gain or Loss

Ashton Manual

<https://www.benzo.org.uk/manual/>

Information about benzodiazepine
withdrawal and safe taper

1st Line Treatment Recommendations

Prolonged Exposure Therapy

- directly address thoughts, feelings, memories related to trauma
- in-vivo and imaginal exposure

Cognitive Processing Therapy

- challenge/modify unhelpful beliefs related to the trauma

Eye Movement Desensitization and Reprocessing EMDR

- Decreases arousal, activates the parasympathetic NS

Central feature of psychotherapy – facilitate recall of the trauma memory to construct a realistic and organized event

Preliminary Strategies

Psychoeducation – stress reaction and PTSD

Teach and practice affect regulation skills

SUDS – Subjective Units of Distress

Recall, process, organize memories (without triggering)

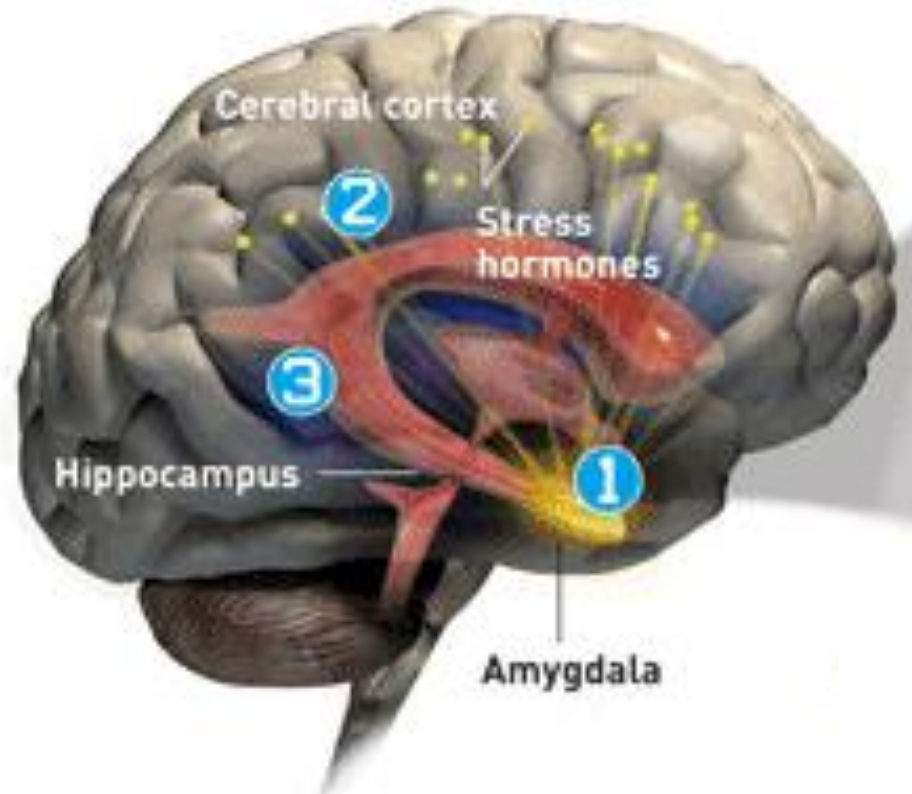
Grieve losses

Establish new normal, sense of safety, mastery

Treatment Plan 1-6 Sessions

1. Get to know you & psychoeducation, ground rules
 2. Preliminaries - relaxation and visualization strategies
breathing, progressive muscle relaxation, safe house
 3. With permission – controlled trauma reconstruction
 4. 5. 6. Rinse – repeat – gaining mastery
 - 6+ – Avoidance behaviors, interpersonal, psychosocial
- FUTURE:** expect trigger events, relapse, it gets easier

Post Traumatic Stress Disorder



THANK YOU!!!!

AJK@UAB.EDU