

POST-TRAUMATIC STRESS DISORDER AND TRAUMATIC BRAIN INJURY IN THE RETURNING VETERAN POPULATION

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MORALITY

- ▣ A code of values and customs that guide social conduct
- ▣ *“Descriptive”* morality is a code of conduct held by a particular society or group that determines right and wrong
- ▣ *“Normative”* morality is a universal code of moral actions and prohibitions held by rational people

MORALITY

- ▣ **Neurobiology is concerned with “*normative*” morality which strengthens social cohesion and cooperation**
 - **GUILT**
 - **SHAME**
 - **EMBARRASSMENT**
 - **GRATITUDE**
 - **COMPASSION**
 - **FEAR OF NEGATIVE EVALUATION**
 - **FAIRNESS AND EQUITY**
 - **NO-HARM**

NEUROBIOLOGY OF MORAL BEHAVIOR

- ▣ “Neuromoral” network for responding to a moral dilemma
- ▣ Centered in the *right ventromedial prefrontal cortex and its connections*
- ▣ Neurobiological evidence indicates the existence of automatic “prosocial” mechanisms for identification with others that is a part of the moral brain

NEUROBIOLOGY OF MORAL BEHAVIOR

- ▣ Main neuromoral areas of the brain
 - *Ventromedial Prefrontal Cortex (VMPFC)*
 - *Orbitofrontal Prefrontal Cortex (OFC)*
 - *Ventrolateral Cortex (VL)*
 - *Amygdala*
 - *Dorsolateral Prefrontal Cortex (DLPFC)*

NEUROBIOLOGY OF MORAL BEHAVIOR

- ▣ **VMPFC**
 - **Attaches moral and emotional value to social events; anticipates future outcome and participates in Theory of Mind (TOM), empathy and attribution of intent (participates in prosocial affiliative or social attachment emotions-guilt, compassion)**
- ▣ **OFC/VL**
 - **Mediates socially aversive responses, changes responses based upon feedback; inhibits impulses, automatic or amygdalar responses**

NEUROBIOLOGY OF MORAL BEHAVIOR

- ▣ **Amygdala (Anteromedial Temporal Lobes)**
 - **Mediates the response to threat and aversive social and moral learning**
- ▣ **DLPFC**
 - **Can overrule the neuromoral network through application of reasoned analysis of the moral situation**
- ▣ **Other areas found active are the insula, anterior cingulate gyrus and temporoparietal junction**

NEUROBIOLOGY OF MORAL BEHAVIOR

- ▣ **VMPFC more activated by “personal” moral dilemmas involving the possibility that direct action could cause another harm; it is automatic**
- ▣ **VMPFC involved in inferring the intention of others behavior (TOM)**
- ▣ **TOM and empathy are closely related to morality**

NEUROBIOLOGY OF MORAL BEHAVIOR

- ▣ **OFC/VL and neighboring anterior insula and amygdala on right side effects altruistic punishment through sentiments linked to social aversion/exclusion such as anger, indignation, disgust and contempt**
- ▣ **DLPFC more activated by “impersonal” moral dilemmas suggesting a dispassionate reasoned or cost-benefit assessment for moral judgments**

MORAL INJURY

- ▣ **DSM III “Guilt about surviving while others did not” or “about behaviors required for survival” were symptoms of PTSD**
- ▣ **Since then very little attention paid to the lasting impact of moral conflict as psychological trauma**
- ▣ **Military culture fosters an intensely moral and ethical code of conduct**
- ▣ **Current wars are creating morally questionable and ethically ambiguous situations**

MORAL INJURY

▣ EMOTIONS

- Experience of self-oriented negative moral emotions such as *shame and guilt*
- *GUILT is a painful and motivating cognitive and emotional experience tied to specific acts of transgression of a personal or shared moral code*
 - ▣ Reduces the likelihood of participating in risky or illegal behavior
 - ▣ Often results in amends

MORAL INJURY

▣ EMOTIONS

- *SHAME is a global evaluation of the self along with behavioral tendencies to avoid and withdraw*
 - ▣ Results in toxic interpersonal difficulties such as anger and reduced empathy for others
 - ▣ More damaging than guilt
 - ▣ May be a more integral part of moral injury
- *SHAME is related to the expectation of negative appraisal by important others*
 - ▣ *Avoidance is not surprising*

MORAL INJURY

▣ EMOTIONS

- *SHAME* is visceral
- Involves the *parasympathetic* branch of the *autonomic nervous system*
 - ▣ Shutdown for repair, digestion, elimination and storage of chemistry necessary for engagement
 - AVOIDANCE
 - WITHDRAWAL
- Mediated by *endorphins*

MORAL INJURY

- ▣ ***SELF-FORGIVENESS***
 - **A set of changes where one becomes...**
 - ▣ **Less likely to avoid stimuli associated with the offense**
 - ▣ **Reduces motivation toward self-injurious behavior**
 - ▣ **Increases motivation to act benevolently toward self**
- ▣ **So if a soldier feels remorse about behavior, he/she will feel guilt**
- ▣ **If blame themselves for personal inadequacy he/she will experience shame**

MORAL INJURY

- ▣ **If shame is generalized, internalized as a flaw and is enduring, he/she will experience shame and anxiety about being judged**
- ▣ **If this leads to withdrawal then corrective experiences are thwarted**
- ▣ **Will see reexperiencing, numbing and withdrawal (avoidance symptoms)**

Moral Injury

- ▣ Many service members may mistakenly take the life of a civilian, be directly responsible for the death of an enemy combatant, unexpectedly see dead bodies or see ill or wounded women and children who they are unable to help
- ▣ *Exposure to atrocities is related to reexperiencing and avoidance symptoms*

MORAL INJURY AND PTSD

- ▣ *Exposure to atrocities does not appear to be associated with hyperarousal symptoms*
 - Arousal symptoms stem from high sustained fear due to real or perceived threat to life
- ▣ **Exposure to atrocities was only related to reexperiencing and avoidance**
 - **Morally injurious experiences are recalled intrusively and a combination of avoidance and emotional numbing may also be present**

MORAL INJURY AND PTSD

- ▣ **Killing, regardless of one's role in the act, is a good indicator of chronic PTSD symptoms**
 - **Also correlated with alcohol abuse, anger and relationship problems**
- ▣ **Subjective reactions are important**
 - **Combat-related guilt (based on acts of commission or omission) is associated with reexperiencing and avoidance symptoms**
 - **Combat guilt largely related to reexperiencing and avoidance symptoms but not arousal symptoms**

MORAL INJURY AND PTSD

- ▣ *It appears participation in atrocities and killing is chiefly implicated in reexperiencing and avoidance symptoms*
- ▣ **Moral injury includes acts of transgression creating dissonance and internal conflict by violating beliefs about right and wrong and one's sense of personal goodness**
 - **How it is reconciled is key**
 - **If cannot accommodate or assimilate the event within existing schemas about self and others, guilt will be experienced, as well as, shame and anxiety about the personal consequences (being ridiculed)**

MORAL INJURY AND PTSD

- **Poor integration leads to lingering psychological distress with frequent intrusions and avoidance behaviors which thwarts accommodation**
- **Individuals with moral injury may see themselves as immoral, irredeemable and unreparable and may believe the world is immoral**

MORAL INJURY

- • • Exposure to human remains is one of the most consistent predictors of long-term distress.

--McCarroll, Urgane & Fullerton, 1995

MORAL INJURY

Assessment Questions

- 1. At what point did you think or believe that you would not live and no longer cared about yourself?**
- 2. Did you lose a friend or member of your unit to injury or death?**
- 3. Were you exposed to dead bodies?**
- 4. Did you feel numbed-out, unmoved, unable to sense loss or the sanctity of life?**

MORAL INJURY

- . . . Being able to pull the trigger through muscle memory is not the same as being able to reconcile the act afterward.**

--Philipps, 2010

MORAL INJURY

Be too careful and you could die... Be too aggressive and you might not be able to live with yourself.

Mistake the foe for a friend, and perhaps die... *Mistake a friend for a foe and die inwardly.*

--Philipps, 2010

MORAL INJURY

...Many veterans were presenting with difficulties that were not sufficiently addressed in the fear and extinction-based frame that underlies exposure.

Steinkamp, et al., 2011

MORAL INJURY

**... Clinicians and researchers . . .
focus most of their attention on
the impact of life-threatening
trauma, failing to pay sufficient
attention to the impact of events
with moral and ethical
implications.**

--Litz, et al., 2009

MORAL INJURY

...We argue that repeated raw exposure to a memory of an act of transgression without a strategic therapeutic frame for corrective and countervailing attributions, appraisals, and without fostering corrective and forgiveness-promoting experiences outside therapy would be counterproductive at best and potentially harmful.

--Litz, et al. 2009

MORAL INJURY

Therapist Concerns

... Creating a strong relationship between veteran and caregiver to gradually let the veteran explore, accept, and forgive those involved in the trauma, including themselves, then forge new trust-building relationships.

--Philipps, 2010

MORAL INJURY

Therapist Concerns

To encourage disclosure, the therapist must portray

- **Unconditional acceptance**
- **The ability to listen to difficult and morally-conflicted material without revulsion.**

--Litz, et al., 2009; Haley, 1974

It does not help to try simply to forget, nor is it helpful to share gruesome details with those who respond with horror or distress.

--Dewey, 2004

MORAL INJURY

Therapist Concerns

... Concerns about trust and confidentiality are paramount; and it is the constancy of the “person” of the therapist that enables these patients to confide in another person rather than act on their fears and projections.

--Haley, 1974

MORAL INJURY

Therapist Concerns

Develop a knowledge of the exact nature, conditions, issues, environment, locations of the veteran's theatre of operation.

I have found vets' autobiographies about their war experiences the most useful of all readings when it comes to treating war trauma.

--Dewey, 2011 (personal communication with Chris Zaglifa)

MORAL INJURY

Manifestations of Moral Injury

- ▣ **Self-harm**
- ▣ **Poor self-care**
- ▣ **Substance abuse**
- ▣ **Recklessness**
- ▣ **Self-defeating behaviors**
- ▣ **Hopelessness**

MORAL INJURY

Manifestations of Moral Injury

- ▣ **Self-loathing**
- ▣ **Decreased empathy**
- ▣ **Preoccupation with internal distress**
- ▣ **Remorse**
- ▣ **Self-condemning thoughts**
--Litz, et al., 2009; Tangney, et al., 2007; Fisher & Exline, 2006

MORAL INJURY

The bright line that divides legitimate and militarily necessary killing from murder means everything to the psychological and spiritual health of marines.

--Jonathan Shay, 2007

Paper presented, 1st Annual Marine
Corps COSC Conference

MORAL INJURY

- ▣ **Extinction learning is hard-wired**
 - High fear and conditioning resulting from life-threatening events can be healed if the patient sustains sufficient unreinforced exposure to conditioned cues
- ▣ **Hard-wired to recover from loss**
 - If prevail ourselves of opportunities to reattach and reengage positively, grief will heal naturally
- ▣ **Not hard-wired to recovery from moral injury**
 - *Difficult to correct core beliefs about a personal defect or a destructive interpersonal or societal response especially when it leads to withdrawal*

MORAL INJURY

- ▣ **Traditional exposure treatment may not work for moral injury because it does not stem from conditioned responses.**
- ▣ **Repeated exposure to morally conflictual experiences may be harmful**
- ▣ **Cognitive therapy assumes that distorted beliefs about the moral violation are the source of misery**
- ▣ **Judgments and beliefs about the transgressions may be accurate and appropriate**

MORAL INJURY

- ▣ *Goal of Treatment of Moral Injury*
 - REDUCE GUILT AND SHAME TO MILD REMORSE
 - MODIFY AMPLIFYING COGNITIONS
 - ▣ RETURN TO SEEING THE GOODNESS OF THE WORLD AND SELF THAT EXISTED PRIOR TO EXPERIENCE

MORAL INJURY

Treatment Model

- ▣ **CONNECTION**
- ▣ **PREPARATION AND EDUCATION**
- ▣ **MODIFIED EXPOSURE COMPONENT**
- ▣ **EXAMINATION AND INTEGRATION**
- ▣ **DIALOGUE WITH MORAL AUTHORITY**
- ▣ **REPARATION AND FORGIVENESS**
- ▣ **FOSTERING RECONNECTION**
- ▣ **PLAN FOR THE LONG HAUL**

MORAL INJURY

Treatment Model

▣ CONNECTION

- Unconditional acceptance is mandatory This may well be the first time the patient has shared this information.
- They may expect to be received with scorn, disgust or disdain (this is at the core of moral injury)
- Must model implicitly and explicitly the idea of acceptance
- Any discordant expression by the therapist will be experienced as condemnation
- Detachment is not therapeutic

MORAL INJURY

Treatment Model

▣ **PREPARATION AND EDUCATION**

- Patient needs a model of the plan and needs to accept their role in the implementation and success of the plan
- Patient needs to know approaching the psychologically painful material will bring healing and relief and not make matters worse
- Patient needs to understand that concealment is understandable but maladaptive
- Patient needs to understand this is a collaborative experience

MORAL INJURY

Treatment Model

- ▣ **MODIFIED EXPOSURE COMPONENT (Briefer and not necessary if patient can articulate thoughts, appraisals and meanings regarding the event)**
 - This is done in real-time (i.e. the current consideration of an upsetting experience)
 - Patient may close eyes although it is not necessary
 - This reduces the eye-to-eye contact with therapist
 - Can also alter the chair arrangement
 - The goal of the exposure is to foster sustained engagement in the raw aspects of the experience and its aftermath
 - Extinction of strong affect from repeated exposure is not the primary change agent

MORAL INJURY Treatment Model

- ▣ **MODIFIED EXPOSURE COMPONENT**
 - **Focused** emotional reliving is a necessary precondition to change
 - Will be unable to reconsider harmful beliefs stemming from deployment unless they “stay with the event” long enough for their beliefs to become articulated and explicitly discussed
 - This step is done in tandem with the next two steps (EXAMINATION AND INTEGRATION and DIALOGUE WITH A BENEFICIAL MORAL AUTHORITY) where examination of meaning and corrective discourse can take place

MORAL INJURY

Treatment Model

▣ EXAMINATION AND INTEGRATION

- An important step in self-forgiveness, reclaiming a moral core and a sense of personal worth comes from examining the maladaptive beliefs about self and world
- Therapist asks what the event means for service members in terms of how they view themselves and their future
- Therapist asks about what caused the transgression and explores themes
 - ▣ Maladaptive interpretations such as “this will forever define me”, severe self-condemnation “I am bad” or “I am worthless”, “I don’t deserve to live” are explored

MORAL INJURY

Treatment Model

- ▣ **EXAMINATION AND INTEGRATION**
 - Want patient to not deny but also not to overly accommodate
 - The goal is a change of worldview so as not to give up what was just and good about the world and the self prior to the event
 - Allow patient to understand that the state of their mind and conditions of combat created a brain that is not the brain that is here right now
 - Even if the act was bad it is possible to move on and have a good life

MORAL INJURY

Treatment Model

- ▣ **EXAMINATION AND INTEGRATION**
 - It is important for the patient to express remorse and to reach their own conclusions about the event with clinical guidance
 - ▣ Don't try to relieve guilt as patient needs to feel remorseful as part of recovery
 - ▣ Therapists shouldn't assume they have enough knowledge or credibility to offer moral judgments about another's experience

MORAL INJURY

Treatment Model

- ▣ **DIALOGUE WITH MORAL AUTHORITY**
 - In person or empty chair dialogue with a trusted, benevolent moral figure
 - This could be a chaplain, a buddy who has had their back, etc. (someone who does not want them to suffer)
 - Have patient verbalize what they did or saw and how this has affected them and what they believe should happen to them
 - Also enhance the intensity by having them share remorse and sorrow and what they would like to do to make amends if they could

MORAL INJURY MORAL INJURY Treatment Model

- ▣ **DIALOGUE WITH MORAL AUTHORITY**
 - Now therapist asks the patient to verbalize what they believe the moral authority would say to them
 - Want content that is forgiveness oriented (if patient doesn't bring this up the therapist should interject)
 - At the end therapist elicits feedback
 - ▣ "What was that like for you?"
 - ▣ "What are you going to take from this?"
 - ▣ "How has this changed the way you view and feel about the event"
 - Similar to 4th and 5th Step work in AA

MORAL INJURY

Treatment Model

- ▣ **REPARATION AND FORGIVENESS**
 - Making amends as a vehicle of self-forgiveness and repair
 - To amend means to change-in this case to change one's approach to how they live their life
 - This could involve doing good deeds
 - Be careful that the idea of making amends is not taken to extremes or that the amend might injure the other
 - Similar to 8th and 9th Step in AA

MORAL INJURY

Treatment Model

▣ **FOSTERING RECONNECTION**

- If the patient is not able to generalize the therapy experiences and reconnect with loved ones gains will be short-lived
- Prepare patient for any self-disclosure with loved ones
- Foster a dialogue about spirituality if it is consistent with patient's beliefs

▣ **PLAN FOR THE LONG HAUL**

- Values and goals moving forward

Litz et al (2009)

POST-TRAUMATIC STRESS DISORDER

Failure to assimilate trauma leads to the cascading symptoms of PTSD:

- **Avoidance**
- **Re-experiencing**
- **Hyperarousal**
- **Impaired functioning**
- **Maintenance of negative appraisals, shame, guilt.**

POST-TRAUMATIC STRESS DISORDER

The clinician must be able to sort out a possible combat-related incident from those maliciously perpetrated [e.g., a soldier holding his wife down or hitting her due to a nightmare while sleeping may not be considered domestic violence, but a symptom of PTSD].

**Everson and Herzog in Families Under Fire
[2011].**

POST-TRAUMATIC STRESS DISORDER

- ▣ **Young recruits assessed before war experience, during and after return from war**
 - ▣ **Found PTSD does not appear to be triggered by a traumatic battle experience nor does there appear to be a typical trajectory for PTSD symptoms**
 - ▣ **Patterns**
 - **Vast majority were resilient recovering quickly from mild symptoms or altogether impervious**
- Herbert, Scientific Am Mind**

POST-TRAUMATIC STRESS DISORDER

- ▣ **Patterns (continued)**
 - **The rest fell into distinct patterns**
 - ▣ **Group One- No symptoms before deployment or during tour of duty but symptoms spiked after they returned home. Symptoms didn't appear to follow any specific event but around seven months after returning home symptoms had worsened to a point where PTSD diagnosed**
 - ▣ **Group Two- About 13% of subjects showed reduced stress levels during deployment. Before deployment had major anxiety and frequent nightmares that eased in the first months of war only to spike again when safely home. This group had history of earlier life traumatic events. Early life trauma predicted PTSD.**

POST-TRAUMATIC STRESS DISORDER

- ▣ A study of 500 veterans many with combat history were found to have a retinoid-related orphan receptor alpha (RORA) gene and one of its variants rs8042149
- ▣ The variant is a single nucleotide polymorphism or SNP- a change in one of the chemical bases that make up the gene. One gene can have thousands of such variants
- ▣ RORA has been implicated in ADHD, depression and bipolar disorder and is neuroprotective

POST-TRAUMATIC STRESS DISORDER

- ▣ RORA detects changes in the biochemical cellular environment and responds to the changes such as stress
- ▣ Rs8042149 may reduce the capacity of neurons to respond to the biochemical stressors induced by traumatic stress
- ▣ Theory holds the RORA risk variant (rs8042149) makes neurons less able to mount a defense against the damaging effects of stress on the brain

Mirkin. "Study Links Gene to PTSD Risk". Brain in the News, September , 2012, pgs. 1-2. or <http://goo.gl/ISKpk>

POST-TRAUMATIC STRESS DISORDER

Behavioral Exposure Therapy

- ▣ **International Society for Traumatic Stress Studies**
 - **Behavioral Exposure Therapy**
 - ▣ **Imaginal Exposure**
 - **Repeated recounting of traumatic memories**
 - ▣ **In Vivo Exposure**
 - **Confronting trauma related situations**
 - ▣ **Virtual Reality**
 - **Computer simulation**

POST-TRAUMATIC STRESS DISORDER

Behavioral Exposure Generally Combined With

- ▣ **Relaxation Training**
 - **Controlled Breathing**
 - **Muscle Relaxation**
- ▣ **Psychoeducation**
- ▣ **Cognitive Restructuring**
 - **Safety, trust, power, esteem and intimacy**

PTSD Treatment and MTBI

Very Preliminary Findings*

- Prolonged exposure (PE) therapy
 - Patients with probable MTBI responded well to PE with reduced PTSD symptoms
 - MTBI appeared to be related to generally higher symptoms at pre-treatment, slower rate of change
 - PE was well-suited to MTBI given individualized sessions and simple rationales that do not require significant higher level verbal reasoning
 - No modifications to standard protocol were needed but the following may be considered:
 - More repetition, different presentation (augmenting discussion with visual presentation), simplification of material

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **mTBI increases the risk for developing PTSD**
- ▣ **TBI can predate the occurrence of PTSD or be sustained in the course of the event that triggers PTSD or be sustained after PTSD has developed**
- ▣ **Does the individual suffer from PTSD?**
 - **Acute Stress Disorder (ASD) places emphasis on dissociative symptoms-depersonalization, derealization, reduced awareness, emotional numbing and dissociative amnesia**

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ These reactions (ASD) may be associated with the loss of consciousness or concussion rather than the psychological response arising in intense fear and arousal
- ▣ It is most useful to concentrate on the presence of reexperiencing and hyperarousal symptoms

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **COGNITIVE BEHAVIORAL THERAPY (CBT)**
 - **Psychoeducation**
 - **Anxiety Management**
 - **Cognitive Restructuring**
 - **Imaginal and *in-vivo* exposure**
 - **Relapse Prevention**

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **PSYCHOEDUCATION**
 - **Present patient with information about common symptoms and assess to make sure they understand their particular symptoms**
 - **Normalize the trauma reaction**
 - **Establish the rationale for treatment while getting patients verbal commitment to proceed**

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **PSYCHOEDUCATION**
 - **Strategies for the prevention of future injury**
 - **Self-monitoring of symptoms**
 - **Awareness of limitations**
 - **Contact information**
 - **How and when to ask for help**
 - **How to participate in treatment**

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **ANXIETY MANAGEMENT (to gain a sense of mastery over fear and reduce arousal levels)**
 - **Breathing Retraining**
 - **Progressive Muscle Relaxation**
 - **Mindfulness/Centering Prayer**
 - **Self-talk Management**
 - ▣ **Discernment**
 - **Grounding**

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **COGNITIVE RESTRUCTURING (belief that maladaptive appraisals underlie PTSD symptoms)**
 - “My life is destroyed”
 - “Why did I live and my best friend died?”
 - “I should have seen the bomb”
 - “It is all my fault”
- ▣ **ID and evaluate the evidence for negative automatic thoughts**
- ▣ **Help evaluate beliefs about the trauma-the self, the world and the future**

POST-TRAUMATIC STRESS DISORDER: Treatment

▣ COGNITIVE RESTRUCTURING

- Helps patient accept the reality they did not encode some information during periods of impaired consciousness
- Some may experience guilt, anger or fear because of the way they interpret events that occurred during loss of consciousness
- Help them use available information to not catastrophize the event

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **IMAGINAL AND *IN-VIVO* EXPOSURE
(Behavioral Exposure)**
 - **Centerpiece of therapy**
 - **Vividly imagine the traumatic episode
for prolonged periods**
 - ▣ **VERBALLY**
 - ▣ **IN WRITTEN FORM**
 - ▣ **VIRTUAL REALITY**
 - **Develop a coherent narrative**

POST-TRAUMATIC STRESS DISORDER: Treatment

- ▣ **IMAGINAL AND *IN-VIVO* EXPOSURE**
Exposure-based therapy is based on the premise that extinction learning occurs when the conditioned stimulus is repeatedly presented in the absence of an aversive outcome, thereby facilitating new learning that the stimulus is no longer signaling threat
- ▣ *In-vivo like treating panic with graded exposure or behavioral desensitization*

POST-TRAUMATIC STRESS DISORDER: Treatment

▣ RELAPSE PREVENTION

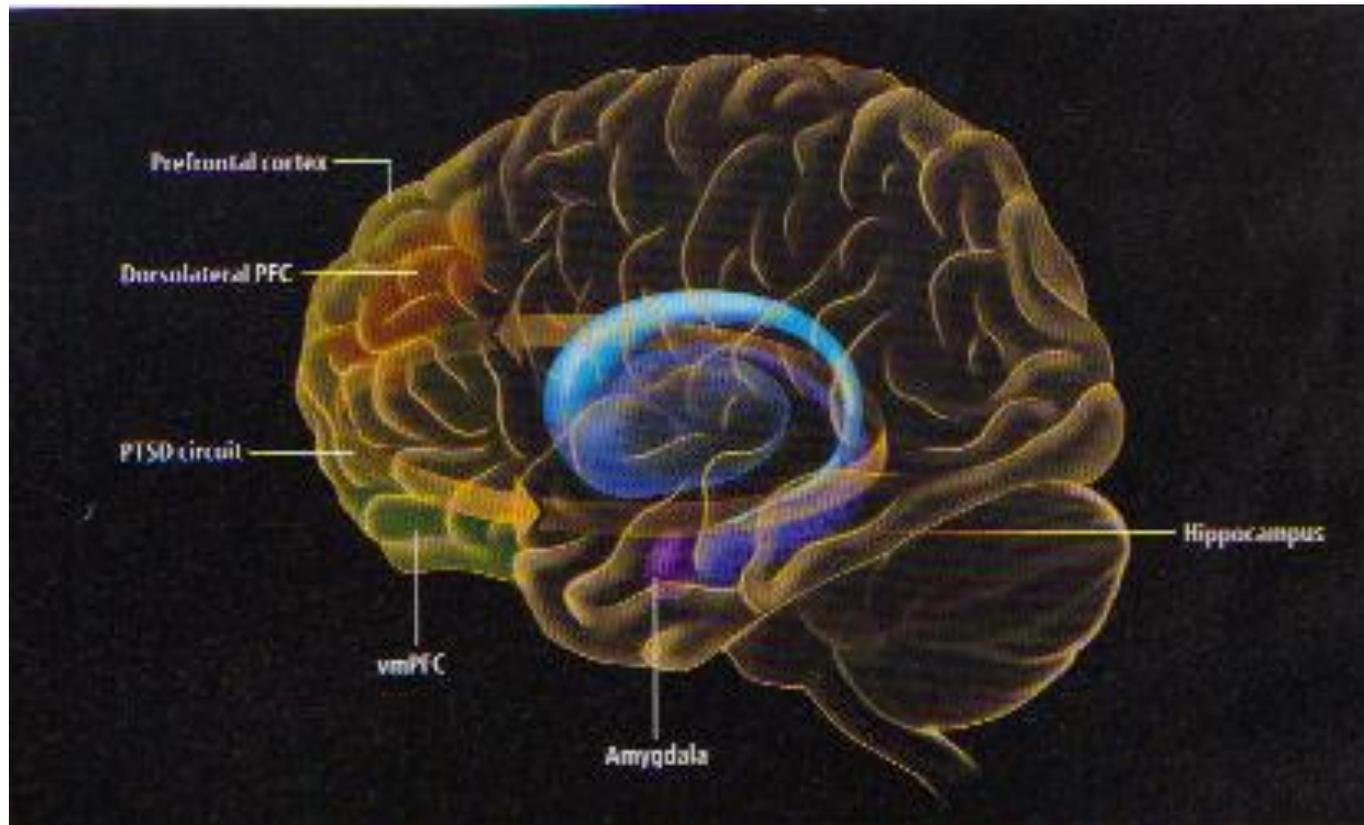
- Helping patient deal with residual symptoms as treatment should significantly diminish symptoms but will not make all of them go completely away
 - ▣ Example-nightmares and insomnia
- Develop plans for maintaining abstinence if alcohol and drugs are a problem
- Develop plans to manage Eating Disorders, gambling and other process addictions
- On-going personal maintenance plan

POST-TRAUMATIC STRESS DISORDER: Treatment

▣ MECHANISMS OF ACTION

- **FEAR CONDITIONING**-A traumatic event (unconditioned stimulus) leads to a fear reaction (unconditioned response) which becomes conditioned to many stimuli associated with the traumatic event
- According to this model successful recovery from trauma involves extinction learning in which repeated exposure to trauma reminders or memories result in new learning that these reminders do not signal threat
- *CBT is a form of extinction learning in which conditioned fear responses are inhibited by new learning of safe associations*

POST-TRAUMATIC STRESS DISORDER CIRCUIT



TREATMENT OF PTSD-

Extinction

- ▣ MALFUNCTIONING OF THE VENTROMEDIAL PREFRONTAL CORTEX (vmPFC) IS THOUGHT TO INCREASE VULNERABILITY BECAUSE IT MODULATES THE AMYGDALA, A DRIVER OF FEAR AND ANXIETY
- ▣ NORMALLY EXTINCTION REPLACES A FEAR RESPONSE WHEN A NEUTRAL RESPONSE IS LEARNED BY THE HIPPOCAMPUS AND THE DORSOLATERAL PREFRONTAL CORTEX
- ▣ THE vmPFC IS BELIEVED TO SERVE AS THE CRITICAL LINK BETWEEN THE DORSOLATERAL PFC AND THE AMYGDALA ALLOWING EXTINCTION LEARNING TO QUIET THE AMYGDALA

TREATMENT OF PTSD-Extinction

- ▣ SYMPTOMS SUCH AS DISTURBED SLEEP AND INCREASED VIGILANCE ARE EXPECTED IMMEDIATELY AFTER A TRAUMATIC EVENT
- ▣ PTSD DEVELOPES WEEKS, MONTHS AND YEARS LATER IN ABOUT 20% OF TRAUMA VICTIMS
- ▣ EXTINCTION CAN OCCUR VIA REPEATED EXPOSURE TO A PARTICULAR TRAUMA-RELATED MEMORY OR CUE
- ▣ THE FEAR RESPONSE IS REPLACED BY A NEUTRAL RESPONSE. PTSD CAN BE CONSIDERED A FAILURE OF EXTINCTION

TREATMENT OF PTSD–Extinction

- ▣ EVIDENCE SUGGESTS A DYSFUNCTIONAL CIRCUIT MAKES EXTINCTION HARDER TO ACHIEVE
- ▣ KEY BRAIN HUBS FOR FEAR ARE THE AMYGDALA AND A GALAXY OF ADJACENT CELLS CALLED THE BED NUCLEUS OF THE STRIA TERMINALIS
- ▣ THESE TWO AREAS DRIVE VIRTUALLY ALL SYMPTOMS OF FEAR INCLUDING RACING HEART, INCREASED SWEATING, FREEZING AND EXAGGERATED STARTLE RESPONSE

TREATMENT OF PTSD-Extinction

- ▣ IF AMYGDALA IS THE ENGINE OF FEAR, SOMETHING SHOULD BE RESPONSIBLE FOR TURNING IT OFF
- ▣ GREG QUIRK AT THE UNIVERSITY OF PUERTO RICO SHOWED A TINY AREA IN THE PREFRONTAL CORTEX OF RODENTS CALLED THE INFRALIMBIC REGION IS CENTRAL TO FEAR EXTINCTION
- ▣ ACTIVITY IN THIS AREA INCREASES DURING EXTINCTION SERVING AS A BRAKE ON THE AMYGDALA WHILE BLOCKING THE INFRALIMBIC REGION IMPAIRS EXTINCTION

TREATMENT OF PTSD-Extinction

- ▣ IN PTSD, NEUROIMAGING SHOWS REDUCED ACTIVITY IN vmPFC WHICH IS COMPARABLE TO THE RAT'S INFRALIMBIC REGION
- ▣ THE PATIENTS ALSO HAD SMALLER vmPFC RELATIVE TO TRAUMA -EXPOSED CONTROLS
- ▣ EXTINCTION INVOLVES INCREASE IN vmPFC ACTIVITY AND REDUCED FIRING OF PFC

TREATMENT OF PTSD–Extinction

- ▣ **IN COGNITIVE-BEHAVIORAL THERAPY IMAGING SHOWS THE IMPORTANCE OF THE HIPPOCAMPUS FOR ASSESSING CONTEXT AND THE DORSOLATERAL PFC FOR LEARNING TO TOLERATE AND OVERCOME FEAR**
- ▣ **THE DORSOLATERAL PFC DOESN'T DIRECTLY CONNECT TO THE AMYGDALA**
- ▣ **THE vmPFC IS THOUGHT TO BE THE CRITICAL LINK BETWEEN THE DORSOLATERAL PFC AND AMYGDALA ALLOWING COGNITIVE TREATMENT TO PRODUCE NEW LEARNING AND RECOVERY**

INSEL, THOMAS. "FAULTY CIRCUITS". *SCIENTIFIC AMERICAN*. APRIL 2010, PPGS 44-51.

TREATMENT OF PTSD

▣ MECHANISMS OF ACTION

- **COGNITIVE MODEL-Posits that PTSD responses are influenced by:**
 1. **Maladaptive appraisals of the trauma and aftermath-Places considerable emphasis on how people appraise the event, response to the event and the likelihood of future harm (i.e. catastrophic appraisal increases PTSD)**
 2. **Disturbances in autobiographical memory involving impaired retrieval and strong associative memory-Mental representations are encoded at the time of trauma under conditions of extreme stress and are often coded in fragmented ways. Because of this memories are not adequately integrated into autobiographical memory. This contributes to intrusive thoughts. It is felt these memories need to be integrated into normal autobiographical memory (this is what the narrative does) permitting mastery of the memory and associated anxiety (this is what the exposure accomplishes)**

TREATMENT OF PTSD– Pharmacotherapy

- ▣ **SSRI's fluoxetine (Prozac), sertraline (Zoloft) and paroxetine (Paxil)**
 - Allows for more time to think before acting particularly in anger
 - It doesn't sedate or cut a person off from themselves or the world
 - Useless as drugs for overdose
- ▣ **Buspirone (Buspar)**
 - Anti-anxiety drug that works differently from benzodiazepines.

TREATMENT OF PTSD– Pharmacotherapy

- ▣ **Beta-blockers like propranolol (Inderal), nadolol (Corgard) and atenolol (Tenormin)**
 - **Breaks the mind-body-mind vicious cycle in rage reactions**
- ▣ **Low dose lithium**
 - **To help maintain control when angry**
 - **Can be fatal in large overdoses**
- ▣ **Clonidine (Catapres) works well on many PTSD symptoms but only for about a week**

<http://www.dr-bob.org/tips/ptsd.html>

TREATMENT OF PTSD

- ▣ **Variants of trauma-focused therapy**
 - **EMDR (has elements of exposure and cognitive restructuring)**
 - ▣ **Focus attention on traumatic memory while tracking the therapist's finger as it is moved across the visual field**
 - ▣ **Restructuring of memory**
 - ▣ **Patient identifies more adaptive or positive thoughts as again the therapist moves finger across visual field**

TREATMENT OF PTSD

- ▣ **Variants of trauma-focused therapy**
 - **CPT (Cognitive Processing Therapy)**
 - ▣ Reframing unrealistic beliefs about safety, trust, control, esteem and intimacy
 - ▣ Engages traumatic memories by having patient write detailed accounts of the trauma

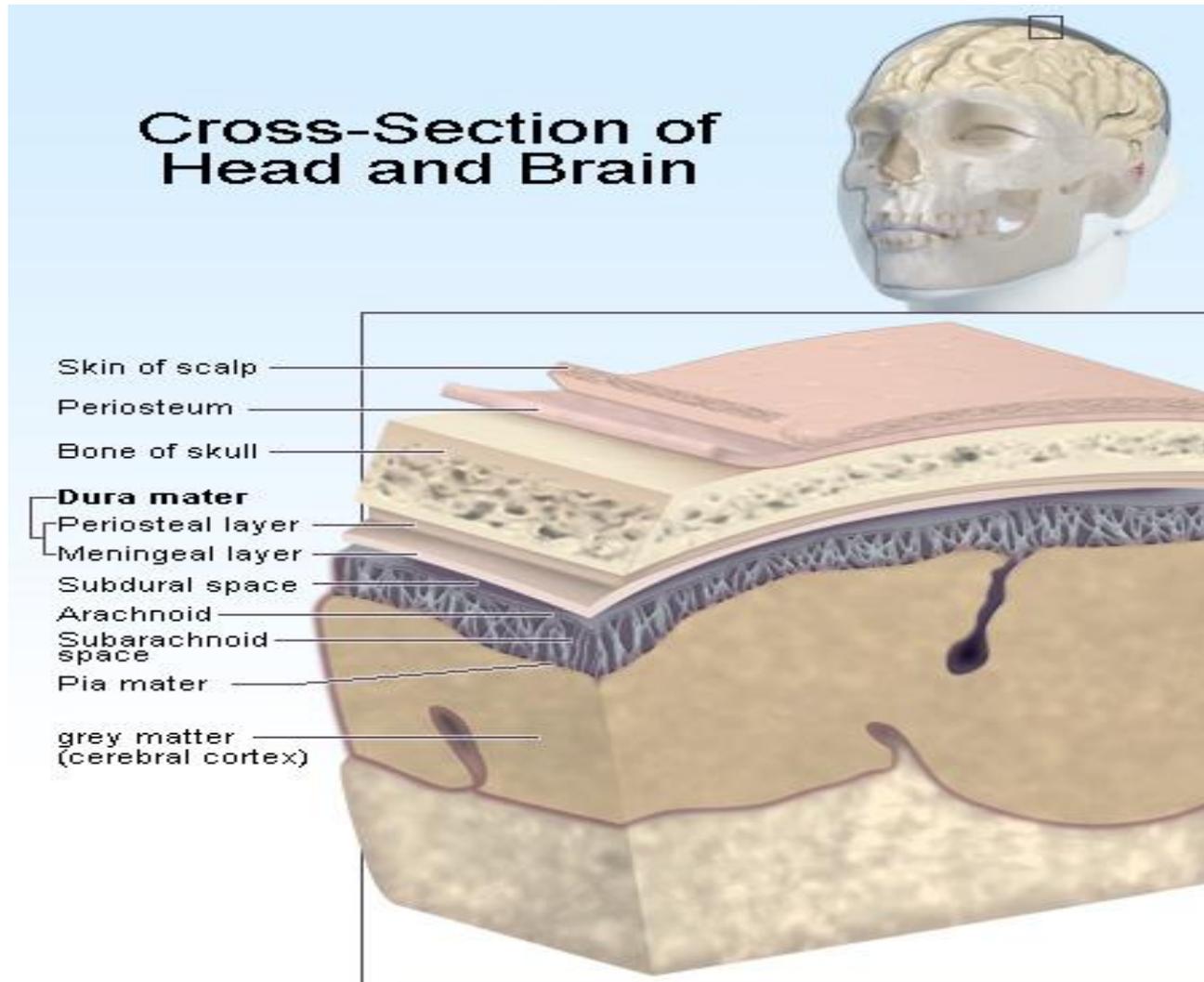
- ▣ **One controlled study with mTBI related PTSD**
 - Patients with ASD following mTBI
 - 5 (1.5 hr.) weekly individual sessions
 - With either CBT or supportive counseling
 - At 6 mo. 8% of CBT group=PTSD while 58% of supportive counseling group=PTSD

What is Traumatic Brain Injury (TBI)?

▣ FOR REFERENCE

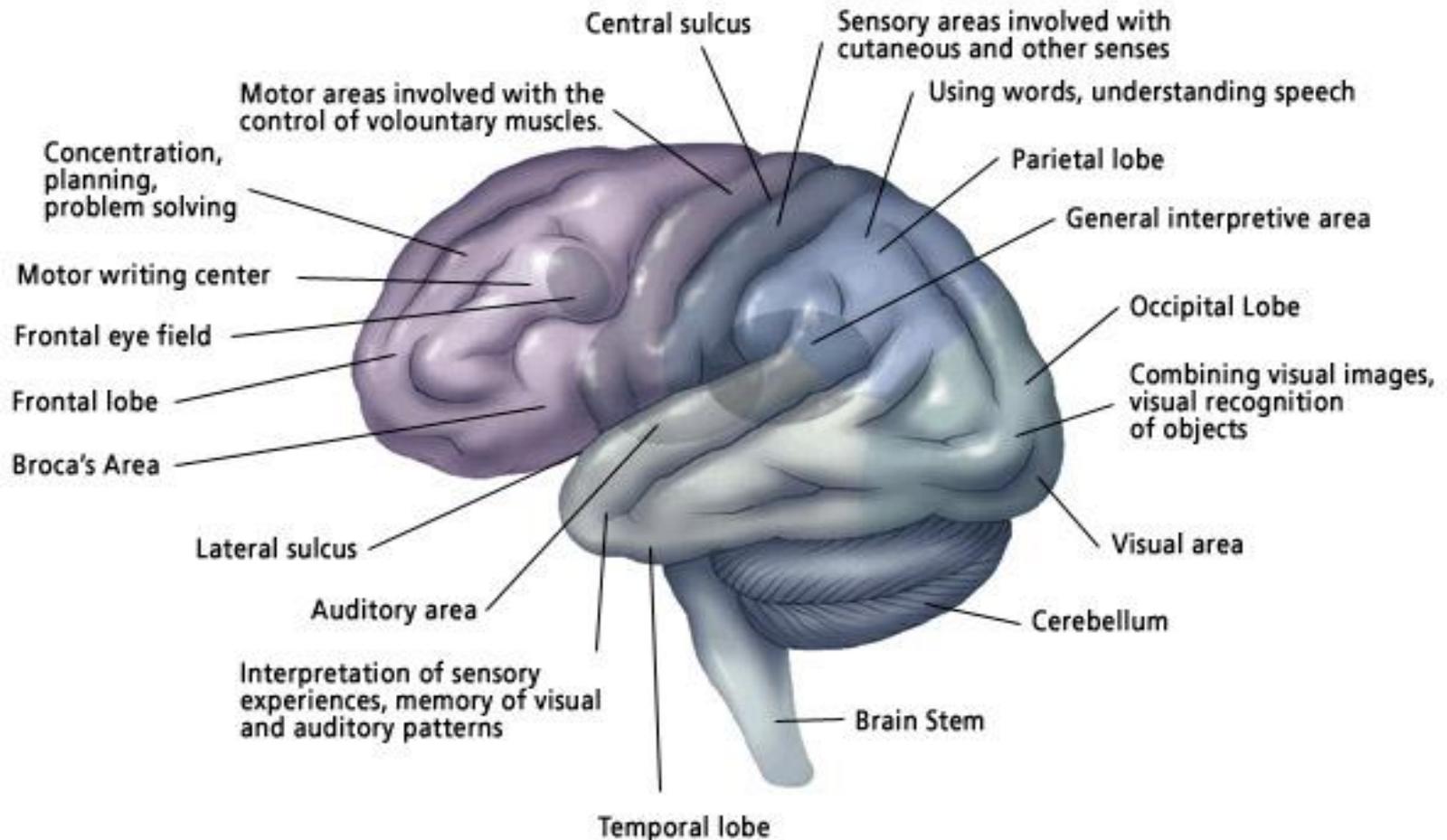
**VA/DoD Clinical Practice
Guideline for Management of
Concussion/mTBI**

What is Traumatic Brain Injury (TBI)?



What is Traumatic Brain Injury (TBI)?

Some Motor, Sensory, and Association Areas of the Cerebral Cortex

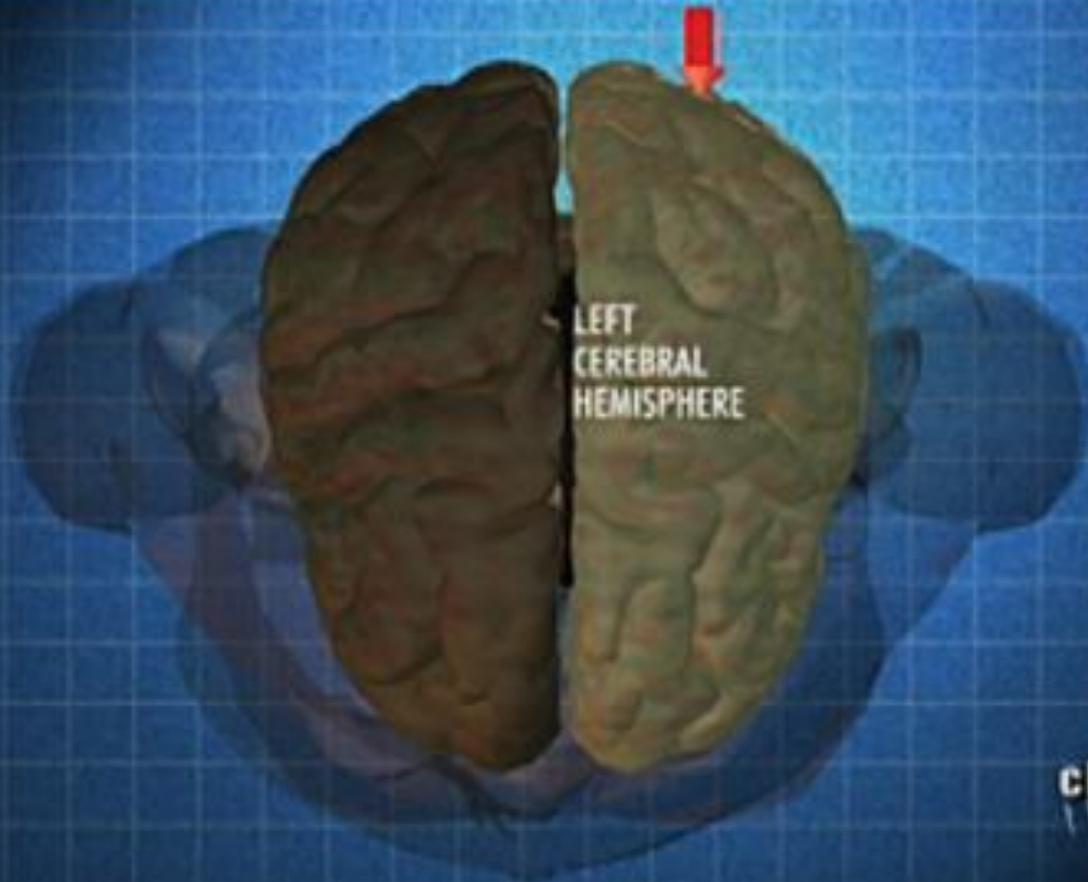


What is Traumatic Brain Injury (TBI)?

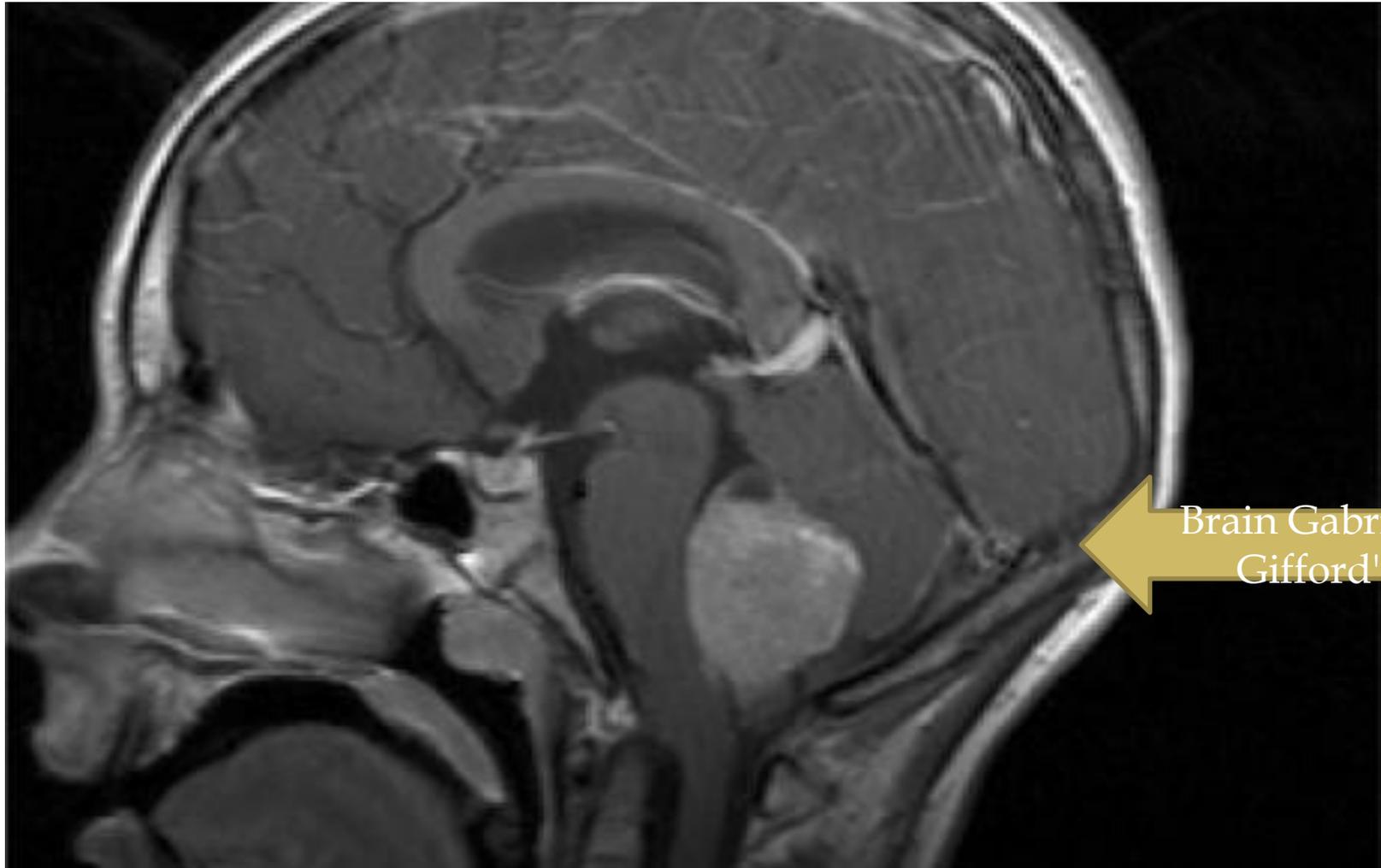
- ▣ **TWO CATEGORIES OF FORCE**
 - **CONTACT OR IMPACT FORCE**
 - **INERTIAL FORCES (ACCELERATION AND DECELERATION)**
- ▣ **CONTACT OR IMPACT FORCE**
 - **Certain brain areas more susceptible**
 - ▣ **Anterior temporal poles**
 - ▣ **Lateral and inferior temporal cortices**
 - ▣ **Orbitofrontal cortices**

Gabrielle Gifford's Brain

Possible Path of Injury



Gabrielle Gifford's Brain

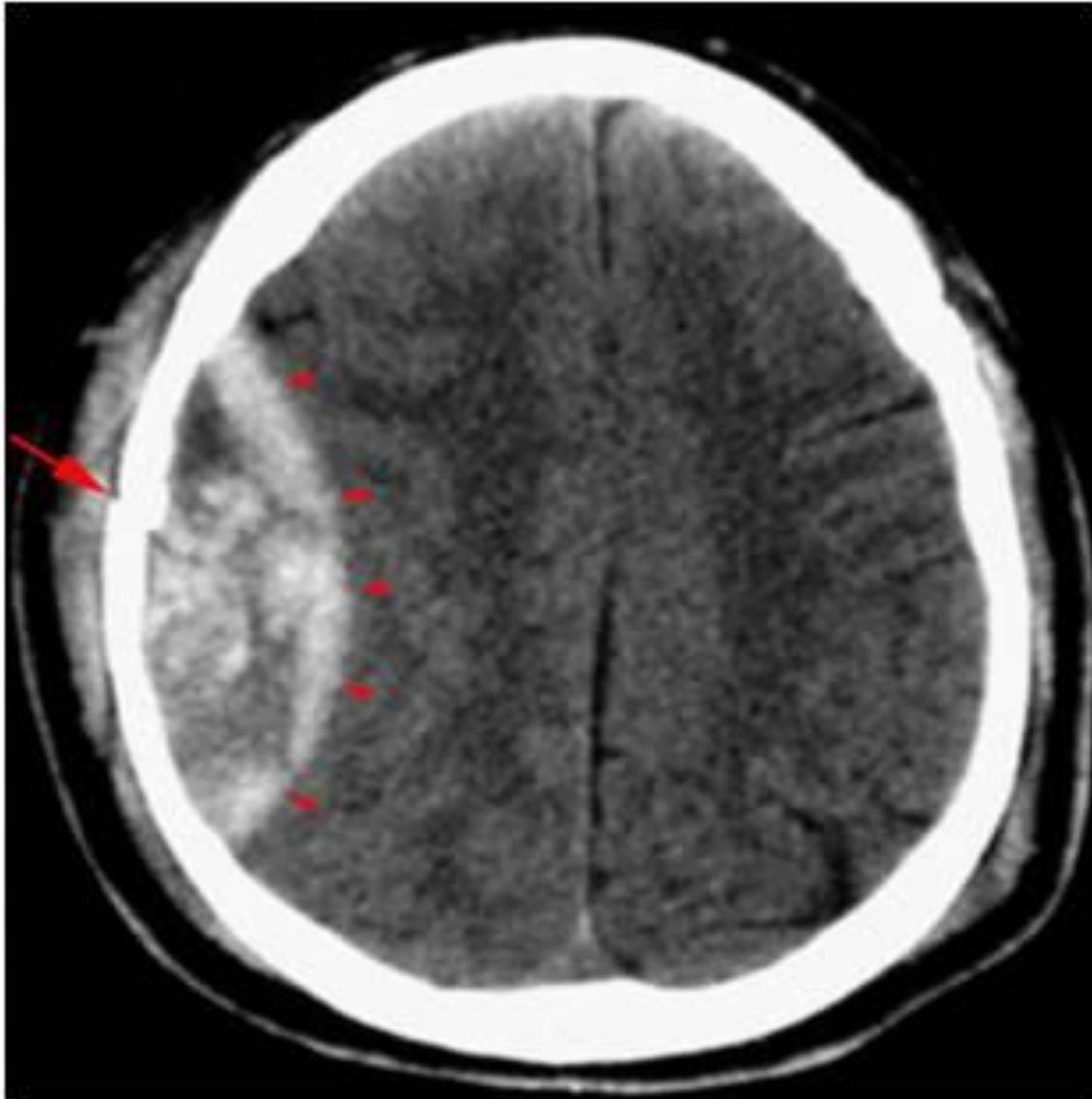


Brain Gabrielle
Gifford's

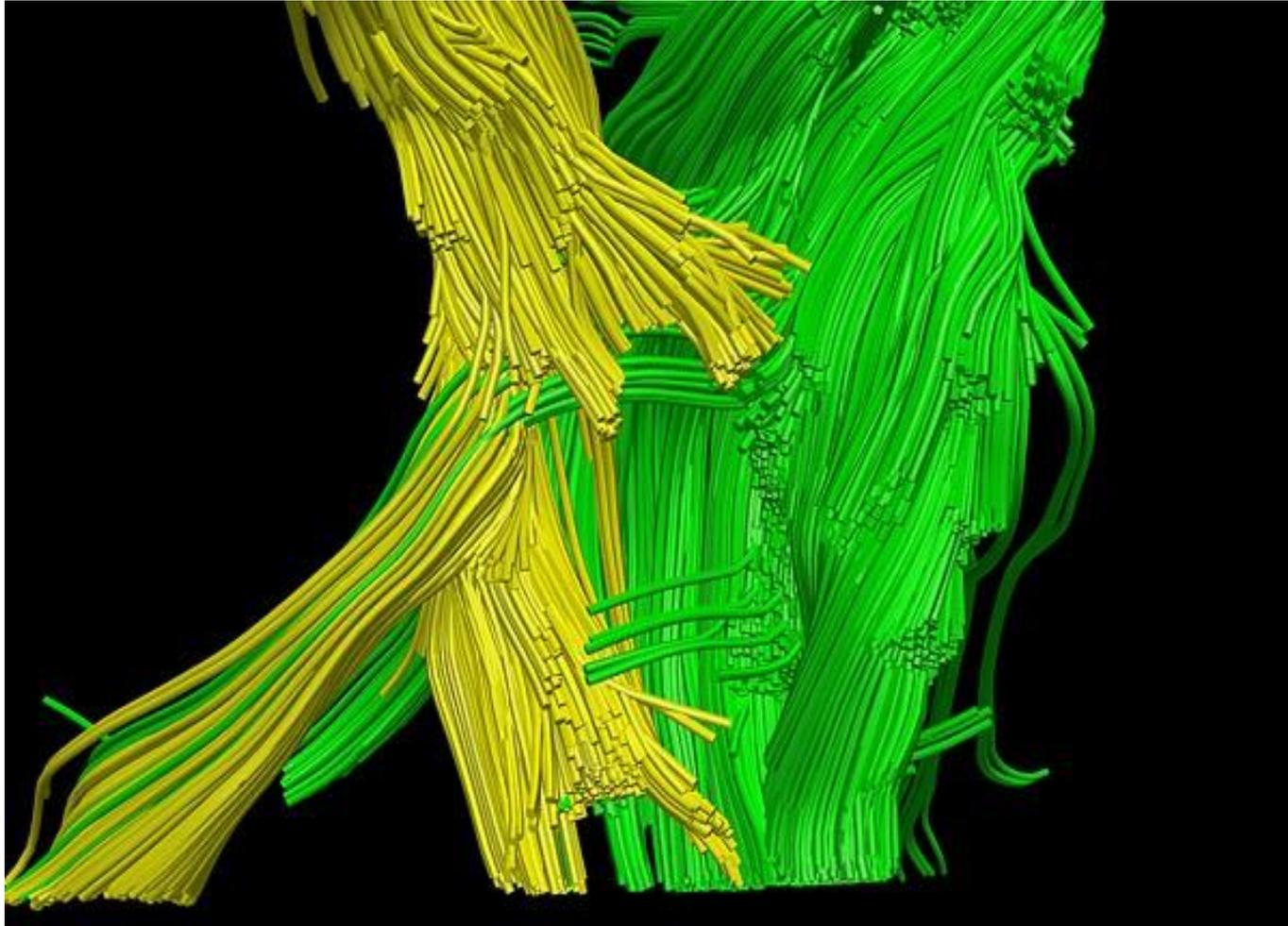
What is Traumatic Brain Injury (TBI)?

- ▣ **INERTIAL FORCES (SHEAR, TENSIL AND COMPRESSION)**
 - **Causes diffuse injury due to tissue tears and intracerebral hematomas**
 - ▣ **White matter (diffuse axonal injury (DAI) or diffuse traumatic injury (TAI)**
 - ▣ **Corpus callosum**
 - ▣ **Rostral brainstem**

What is Traumatic Brain Injury (TBI)?

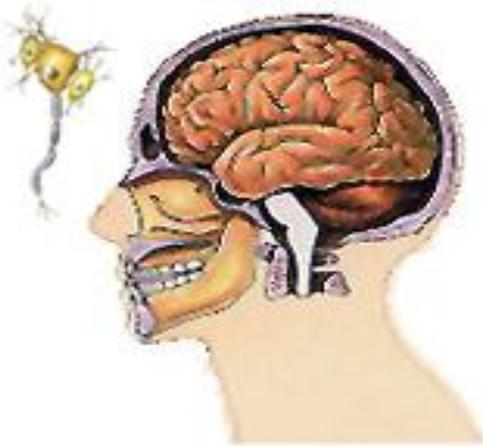


NEW MRI TECHNOLOGY

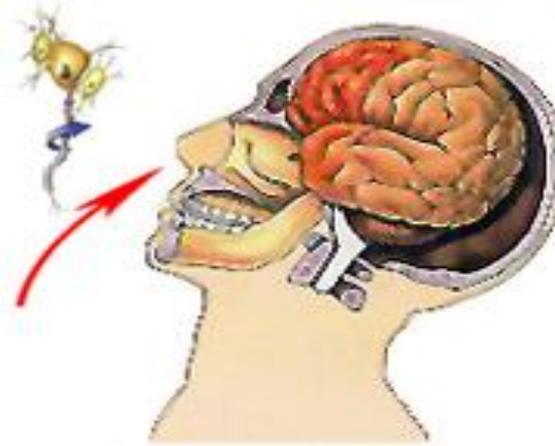


What is Traumatic Brain Injury (TBI)?

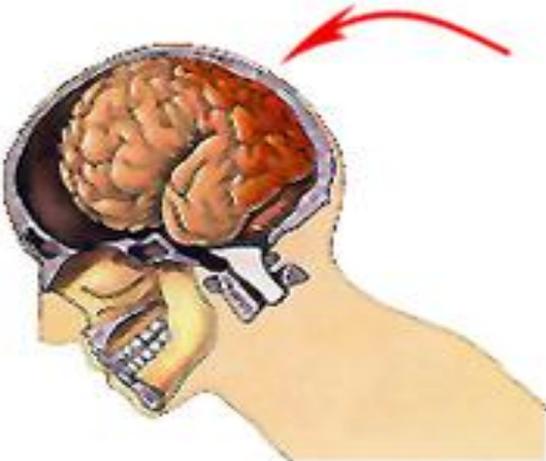
Before impact



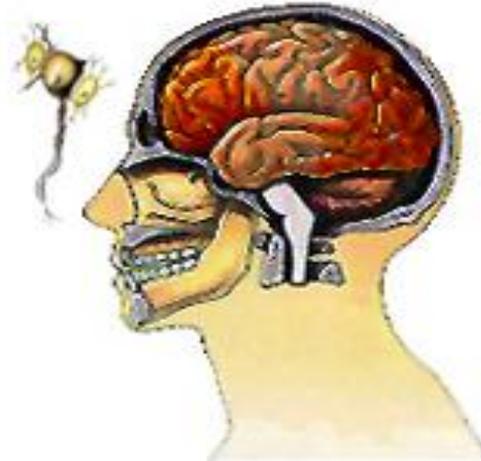
Initial impact: Coup



Secondary impact: Contre-coup



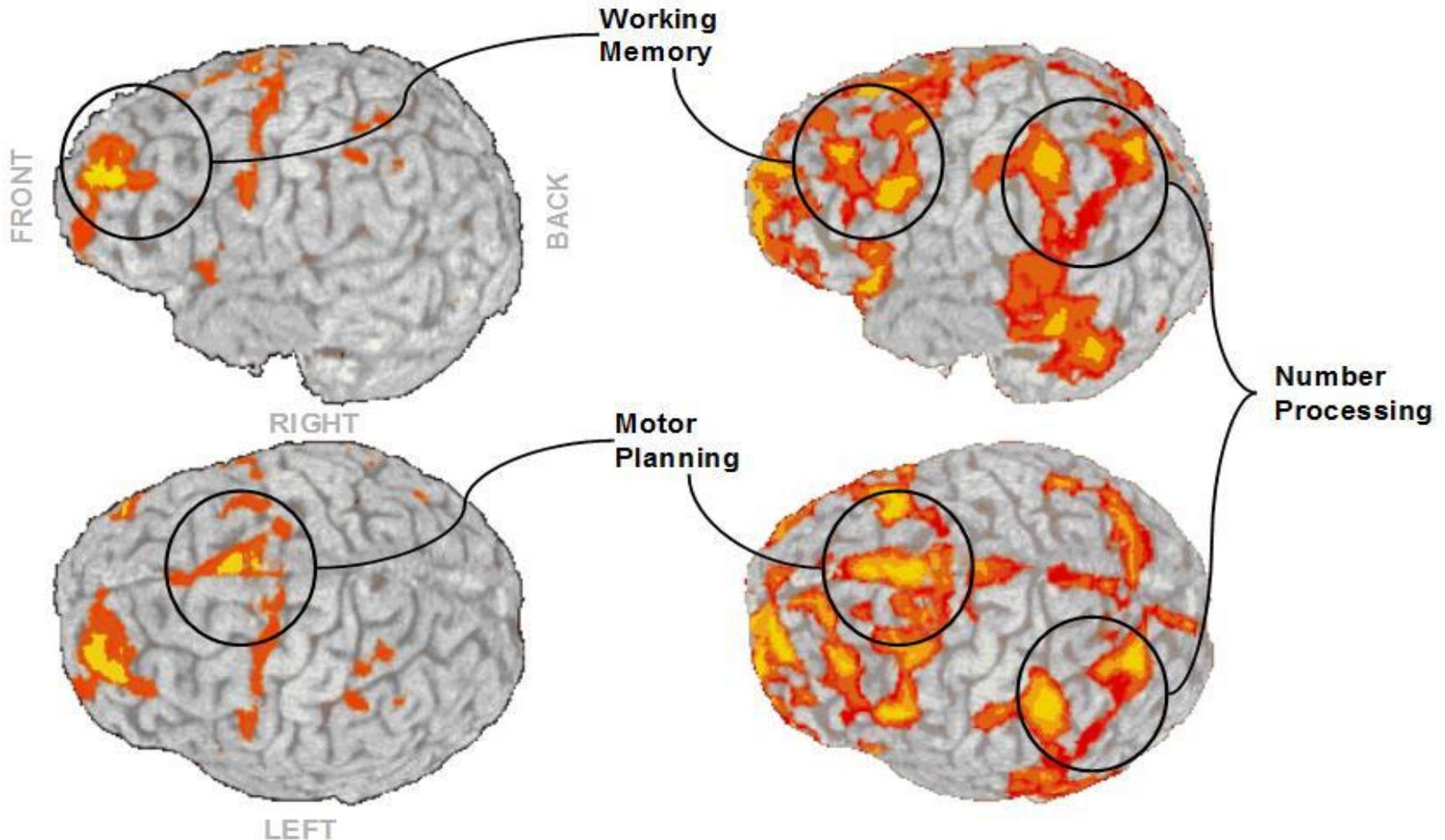
Post-injury



What is Traumatic Brain Injury (TBI)?

Without Concussion

After Concussion



What is Traumatic Brain Injury (TBI)?

- ▣ When neurons are injured they release neurotransmitters (especially glutamate which is excitotoxic)
- ▣ This leads to *secondary injury* (the hippocampus is very sensitive)
 - *Hypoxia*
 - *Ischemia*
- ▣ *Each brain injury is different although certain features are commonly seen*

What is Traumatic Brain Injury (TBI)?

- ▣ **THREE MAJOR FRONTAL-SUBCORTICAL CIRCUITS INVOLVED IN COGNITION AND SOCIAL BEHAVIOR**
 - ▣ **Dorsolateral Prefrontal Circuit modulates executive function**
 - ▣ **Orbitofrontal Cortical Circuit plays a role in intuitive social behavior, self-monitoring and self-correction in social situations**
 - ▣ **Anterior Cingulate Circuit modulates motivated and reward-related behavior**
 - ▣ **Also the Medial Temporal Area play a role in episodic memory and new learning, as well as, smooth integration of emotional memory with current experience**

What is Traumatic Brain Injury (TBI)?

- ▣ **Severity based upon:**
 - **LOSS OF CONSCIOUSNESS**
 - ▣ **Less than 30 minutes-MILD (80%)**
 - ▣ **Between 30 – 60 minutes-MODERATE (10%)**
 - ▣ **More than 60 minutes-SEVERE (10%)**
 - **ABNORMAL RESULTS ON A BRAIN SCAN SUCH AS AN MRI OR CT**
 - **LENGTH OF TIME UNTIL ABLE TO FOLLOW INSTRUCTIONS**
 - **DURATION OF CONFUSION**

PRIMARY CAUSES OF SYMPTOMS

- ▣ *BRUISES*
- ▣ *SWELLING*
- ▣ *SNAPPED NERVE FIBERS*
- ▣ *BROKEN BLOOD VESSELS*

Percussion Trauma

- ▣ **Vets describe them as a flash and not heard. Hearing is gone awhile. They re-call feeling the shock wave and feeling the sand and dirt debris, seeing a cloud of dust, getting thrown, and smelling the cordite. There is a rush of fear as now the expectation is being ambushed. There is a brief sense of relief that one was not killed and then the training kicks in and you go on auto pilot and swing into a defensive action sometimes not even seeing the wounded. Others see the dead and badly injured and tend to them until they are medevac'd out. (personal communication with Chris Zaglifa)**

TBI—MOST COMMON SYMPTOMS

FATIGUE

**IT IS NORMAL TO FEEL TIRED AFTER
HEAD TRAUMA**

**IT WILL EXAGGERATE EVERY OTHER
SYMPTOM**

TBI—MOST COMMON SYMPTOMS

▣ CHANGES IN COGNITION

- Frontal Executive Functions
- Attention
- Short-term Memory and Learning
- Speed of Information Processing
- Speech and Language Functions

▣ CHANGES IN PERSONALITY

- Alterations in Emotional and Behavioral Regulation

TBI—MOST COMMON SYMPTOMS

- ▣ **ALTERATIONS IN EMOTIONAL AND BEHAVIORAL REGULATION**
 - ▣ **IMPULSIVITY**
 - ▣ **May manifest as verbal utterances, snap decisions and poor judgment flowing from the failure to fully consider the implications of a given action**
 - ▣ **Concept of stimulus boundedness where the individual attaches exaggerated salience to a cue without regard to context**
 - ▣ **IRRITABILITY**
 - ▣ **Irritable or more easily angered**
 - ▣ **Response is characteristically out of proportion to the precipitating stimulus**

TBI—MOST COMMON SYMPTOMS

- ▣ **ALTERATIONS IN EMOTIONAL AND BEHAVIORAL REGULATION (continued)**
 - ▣ **AFFECTIVE INSTABILITY**
 - ▣ Exaggerated displays of emotion with paroxysmal onset, brief duration and subsequent remorse
 - ▣ Sometimes called affective incontinence
 - ▣ **APATHY**
 - ▣ May be interpreted as laziness or depression and may be linked to aggression when attempts are made to engage the individual
 - ▣ Can occur with injury to the circuitry of “reward”
- ▣ **LACK OF AWARENESS OF DEFICITS**

“RED” FLAGS

- ▣ **Pupillary Asymmetry**
- ▣ **Seizures**
- ▣ **Repeated vomiting**
- ▣ **Double vision**
- ▣ **Worsening headache**
- ▣ **Slurred speech**
- ▣ **Weakness or numbness in arms/legs**
- ▣ **Confusion and irritability**

COMMON PROBLEMS

▣ **INSOMNIA**

- **Consider using the program called Conquering Insomnia which can be found at CBT for INSOMNIA.com**
- **Evidence-based program developed by DR. Greg Jacob at Harvard Medical School and funded by a NIH grant**
- **In a study conducted at Harvard was found to be more effective than Ambien**

COMMON PROBLEMS

▣ INSOMNIA

- 5 session interactive program
 - ▣ SESSION 1: BASIC FACTS ABOUT SLEEP
 - ▣ SESSION 2: SLEEP SCHEDULING AND STIMULUS CONTROL
 - ▣ SESSION 3: COGNITIVE RESTRUCTURING AND SLEEP MEDICATION TAPERING TECHNIQUES
 - ▣ SESSION 4: DAYTIME RELAXATION TECHNIQUES
 - ▣ SESSION 5: BEDTIME RELAXATION TECHNIQUES

COMMON PROBLEMS

▣ INSOMNIA

- The journal SLEEP demonstrated online CBT program for insomnia effective for improving sleep in 80% of patients
- The interactive version in a study by NIH showed it was comparable to the results garnered from face-to-face CBT
- Wake time after sleep onset was reduced from over an hour to less than 30 minutes per night
- Sleep onset latency decreased from over 30 minutes to less than 20 minutes per night
- Total sleep time increased about an hour

COMMON PROBLEMS

▣ **INSOMNIA**

■ **PHARMACOTHERAPY**

- ▣ **Melatonin-a metabolite of serotonin is a hormone secreted by the pineal gland; plays a role in maintenance of sleep-wake cycle (suprachiasmatic nucleus)**
- ▣ **Tryptophan-precursor amino acid to serotonin**
- ▣ **Antidepressants- Trazodone is a popular choice although not backed by formal clinical studies**

COMMON PROBLEMS

▣ **INSOMNIA**

- ▣ **Nonbenzodiazepine zolpidem (Ambien) and zaleplon (Sonata)**

- ▣ **Both 5-10 mg q hs**

- ▣ **They act on benzodiazepine receptors but are more selective and less likely to produce cognitive side effects**

- ▣ **NOTE: Modafinil (Provigil) has not been found to be superior to placebo in TBI patients**

COMMON PROBLEMS

▣ IRRITABLE BOWEL SYNDROME (IBS)

■ Dietary

- ▣ Avoid caffeine and alcohol.
- ▣ Limit your intake of fatty foods.
- ▣ If diarrhea is your main symptom, limit dairy products, fruit, and artificial sweeteners such as sorbitol or xylitol.
- ▣ Increasing fiber in your diet may help relieve constipation.
- ▣ Avoiding foods such as beans, cabbage, or uncooked cauliflower or broccoli can help relieve bloating or gas.

■ Stress Management

HOW LONG DO THE SYMPTOMS LAST

- ▣ Most rapid recovery occurs during the first week in mild TBI
- ▣ *Most patients will be back to normal in a week to a month*
 - If get proper rest and resume activities slowly
 - If over 40 years old may be slower
- ▣ Everyone recovers differently

REMEMBER

- ▣ PACE YOURSELF
- ▣ THE SYMPTOMS OF MILD TBI ARE SIMILAR TO EVERY DAY STRESS
 - Go slow, get plenty of rest and do not place undue stress on yourself
 - ▣ May consider cognitive therapy to help patient look at how their cognitions are causing them increased stress

Clinical Considerations

- ▣ **Normalize symptoms**
- ▣ **Reassurance about positive outcome**
 - **Placebo effect**
- ▣ **Techniques to manage stress (sleep education, relaxation techniques while minimizing consumption of alcohol, caffeine or other stimulants)**
- ▣ **Information and education for patient and their significant others**

Clinical Considerations

- ▣ **Avoid medications that reduce seizure threshold (bupropion or traditional antipsychotics) or those that can cause confusion (lithium, benzodiazepines, anticholinergic agents)**
- ▣ **Before medicating rule out social factors such as abuse, neglect, environmental and family factors**
- ▣ **Brain injured patients are more sensitive to side effects**
- ▣ **Be careful with any medications that may cause an increase in suicidal ideation**

Clinical Considerations

▣ Pharmacotherapy

- Amantadine (Symmetrel)-used with Parkinson's Disease
 - ▣ Used in mild, moderate and severe TBI
 - ▣ Causes the release of dopamine which might help motivation, alertness and attention
 - ▣ Study results suggest amantadine speeds recovery in more severe TBI
- Methylphenidate (Ritalin)
 - ▣ Used with moderate to severe TBI
 - ▣ Increases processing speed (time required for brain to take in information and act on it)
 - ▣ Improved attention

Clinical Considerations

▣ Pharmacotherapy

■ Zolpidem (Ambien)

- ▣ Generally used to treat insomnia
- ▣ When prescribed to veterans with severe TBI some showed a very different effect
- ▣ The drug actually restored their consciousness and for as long as they continued to take the drug they remained awake and alert

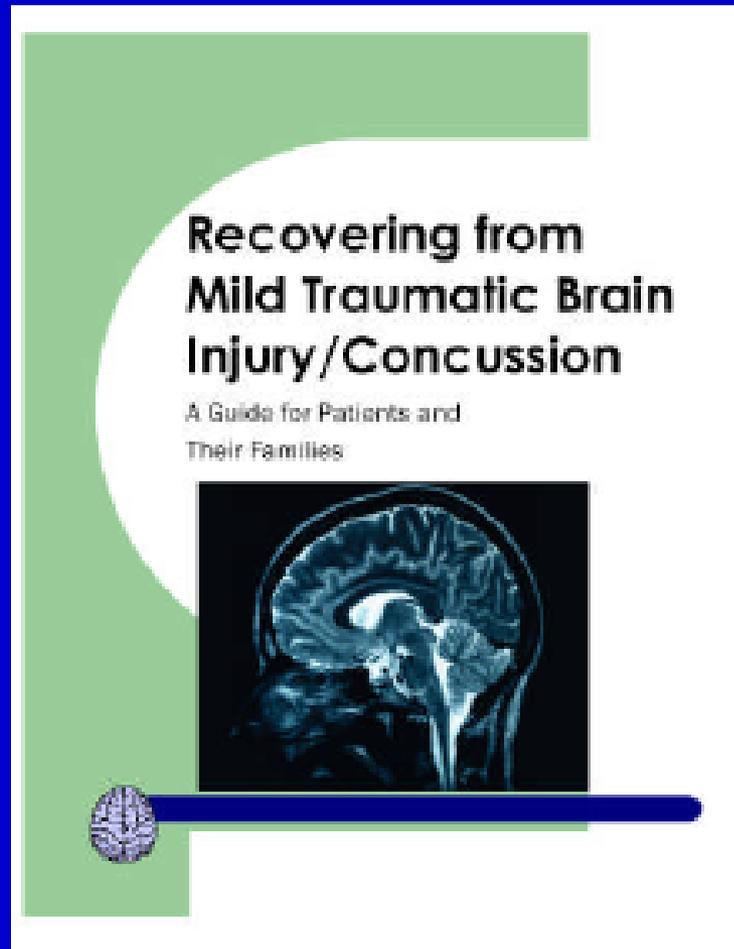
TBI: The Injured Brain. Brain in the News. Dana Foundation. October 2011, pgs. 4-6.

Clinical Considerations

- ▣ **Interdisciplinary Team**
 - **Speech-Language Pathologist**
 - **Occupational therapist**
 - **Physical Therapist**
 - **Social Worker**
 - **Psychologist**
 - **Psychiatrist**
 - **Music therapist**

Positive Expectation of Recovery

Useful Materials



- “A common cause of stress after a mild brain injury is worry about the symptoms you have.
- Scientific studies ... have shown that patients who get an information booklet like this one recover faster and feel better during recovery than patients who do not know what to expect.
- You have been given this booklet so you will know what to expect and what to do about the symptoms you may experience.”

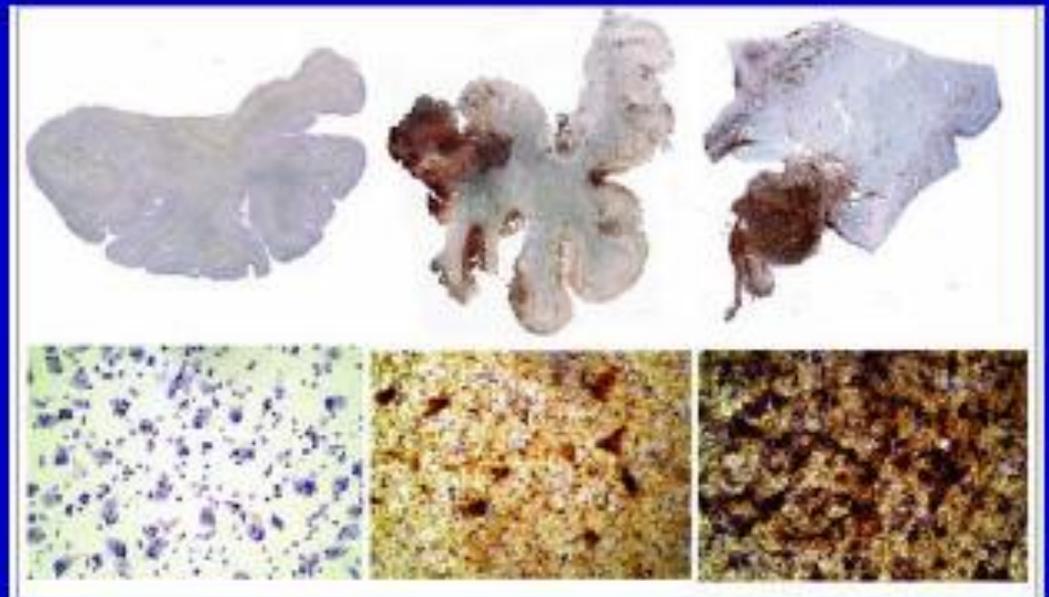
CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

- ▣ **Progressive Degenerative Disease**
- ▣ *History of repetitive brain trauma*
- ▣ **Includes symptomatic concussions, as well as, asymptomatic subconcussive hits to the head**
- ▣ **Triggers progressive degeneration of the brain tissue**
- ▣ **Includes the build-up of a protein called TAU**
- ▣ **Begins months, years or even decades after the trauma**

Report Links Sports Concussion to Chronic Traumatic Encephalopathy

“Postmortem tissue from NFL linebacker John Grimsley showed evidence of chronic traumatic encephalopathy; investigators at Boston University link the condition to his past history of concussions.”

Neurology Today
2 October 2008



TAU PROTEIN IN MEDIAL TEMPORAL LOBE
in postmortem tissue (left to right):
a healthy 65-year-old; NFL player John Grimsley,
age 45; 73-year-old boxer diagnosed with
dementia pugilistica.

CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

▣ SYMPTOMS

- Memory loss
- Confusion
- Impaired judgment
- Impulse control problems
- Aggression
- Depression
- Eventually a progressive dementia

CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

- ▣ **THE SYMPTOMS ARE INSIDIOUS**
 - **First manifestations are generally deterioration in attention, memory and concentration, as well as, disorientation and confusion and occasionally complaints of headache and dizziness.**
 - **With progressive deterioration may see lack of insight, poor judgment, and overt dementia**
 - **Severe cases are accompanied by a progressive loss of muscular movements, a staggered, propulsive gait, masked facies, impeded speech, tremors, vertigo and deafness**

CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

▣ NEUROBIOLOGICAL FINDINGS

- Reduction in brain weight
 - ▣ Frontal lobes
 - ▣ Temporal lobes
 - ▣ Parietal lobes
 - ▣ Less frequently the occipital lobes
- Enlargement of the lateral and third ventricles
- Thinning of the corpus callosum
- Cavum septum pellucidum with fenestrations
- Scarring and neuronal loss of the cerebellar tonsils

CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

▣ NEUROBIOLOGICAL FINDINGS

- **With greater severity**
 - ▣ Atrophy of the hippocampus
 - ▣ Atrophy of the entorhinal cortex
 - ▣ Atrophy of the amygdala
- **Neurofibrillary tangles (NFT's)**
- **Irregular TAU deposits**
- **Tau-positive fibrillar astrocytic tangles found in the white matter**
- **TAU abnormalities suggest core pathology in the amygdalo-hippocampal-septo-hypothalamic-mesencephalic continuum (Papez circuit)**

CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

- ▣ **MECHANISMS OF CEREBRAL INJURY**
 - **Acceleration and deceleration forces**
 - ▣ **Sagittal (front-to-back) injuries result in relatively good recovery**
 - ▣ **Lateral (side-to-side) injuries produce the most damage**

- ▣ **Pathological tangles of tau protein have been found in the brain tissue of four veterans at autopsy Science. 18 May 2012. Vol. 336,pg.790-91.**

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PERMISSION TO USE CERTAIN SLIDES

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RESOURCES

- ▣ Brain Injury Association of America
 - <http://www.biausa.org>
- ▣ Brainline.org
 - <http://www.brainline.org>
- ▣ Centers for Disease Control and Prevention, National Center for Injury prevention and Control Traumatic Brain Injury Page
 - <http://www.cdc.gov/TraumaticBrainInjury/index.html>
- ▣ Defense and Veterans Brain Injury Center
 - <http://www.dvbic.org>