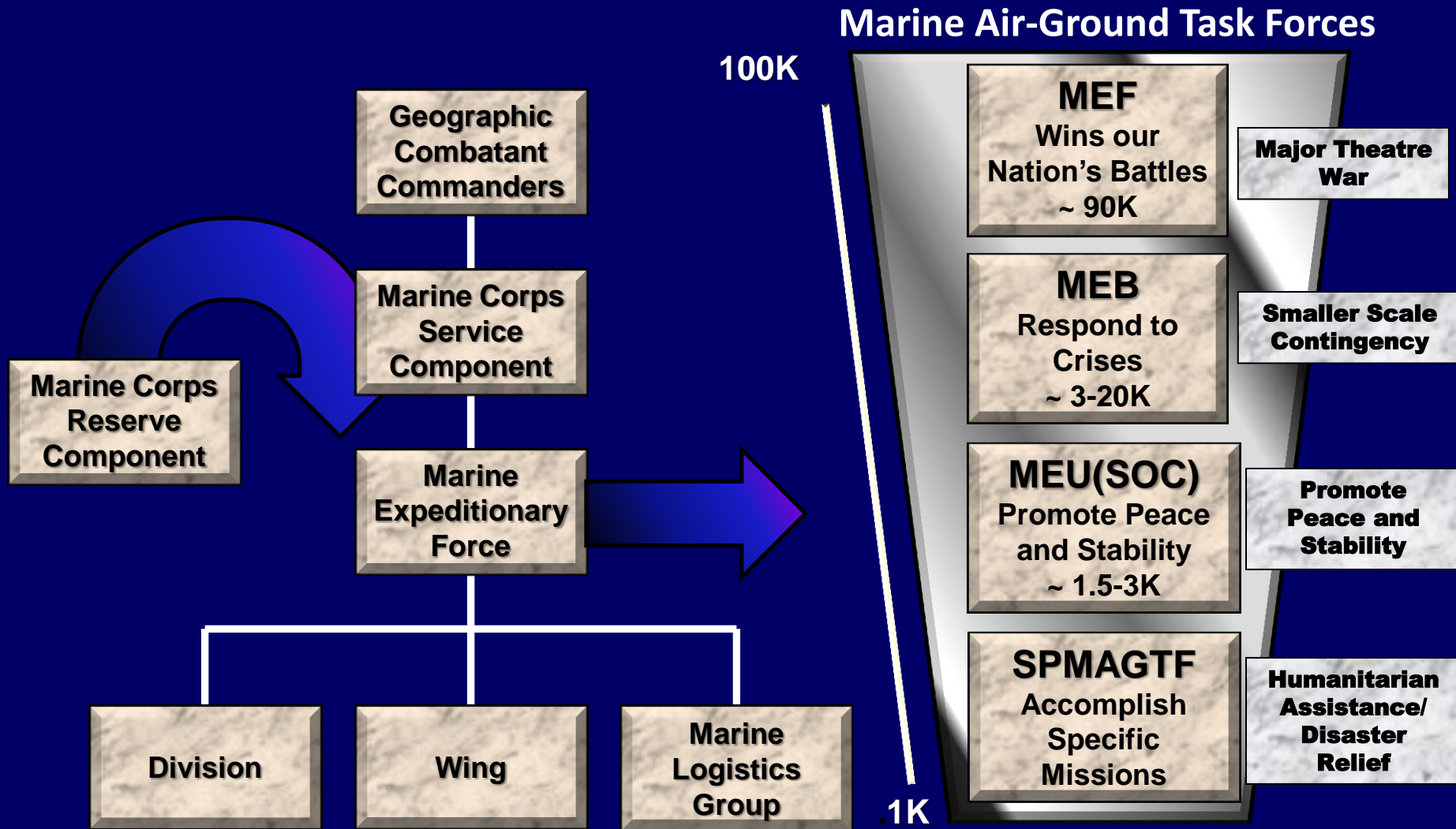


# The United States Marine Corps

*America's Expeditionary Force in Readiness*



# Scalable Marine Forces



**\*\* Forward-deployed MEUs serve as advance echelons of MEBs, which in turn serve as advance echelons of MEFs.**



# Expeditionary Maneuver Warfare Operational Maneuver From the Sea

Medicine needs to respond



# Marine Corps Priorities

- 1) Continue to provide the best trained and equipped Marine units in Afghanistan (TCCC, OEMS, L.A. Trauma Center, EMT, Mojave Viper, CAX )
- 2) Rebalance our Corps and posture it for the future
  - (Joint Medical OPS, Enroute Care, Restoration Centers, Agile MTB w/ ½ STP )



# Marine Corps Priorities

3) Better educate and train our Marines to succeed in complex environments

- (MTB, FRSS/STPs, Next Generation BAS & Corpsman)



4) Keep the faith with our Marines, our Sailors, and our families

- (TBI/PTSD, Wounded Warriors, Garrison Care, Resilience, Reintegration )



# Marine Corps Health Challenges

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- Resiliency
- PTSD
- TBI
- Suicide
- Deployment Health Follow-up
- Mental Health Stigma
- Polytrauma
- Amputation
- Tobacco
- Data
- Evidence-based decisions
- Spice
- Environmental Exposures
- Casualty Care
- Expeditionary Medicine
- Medical Stability Operations

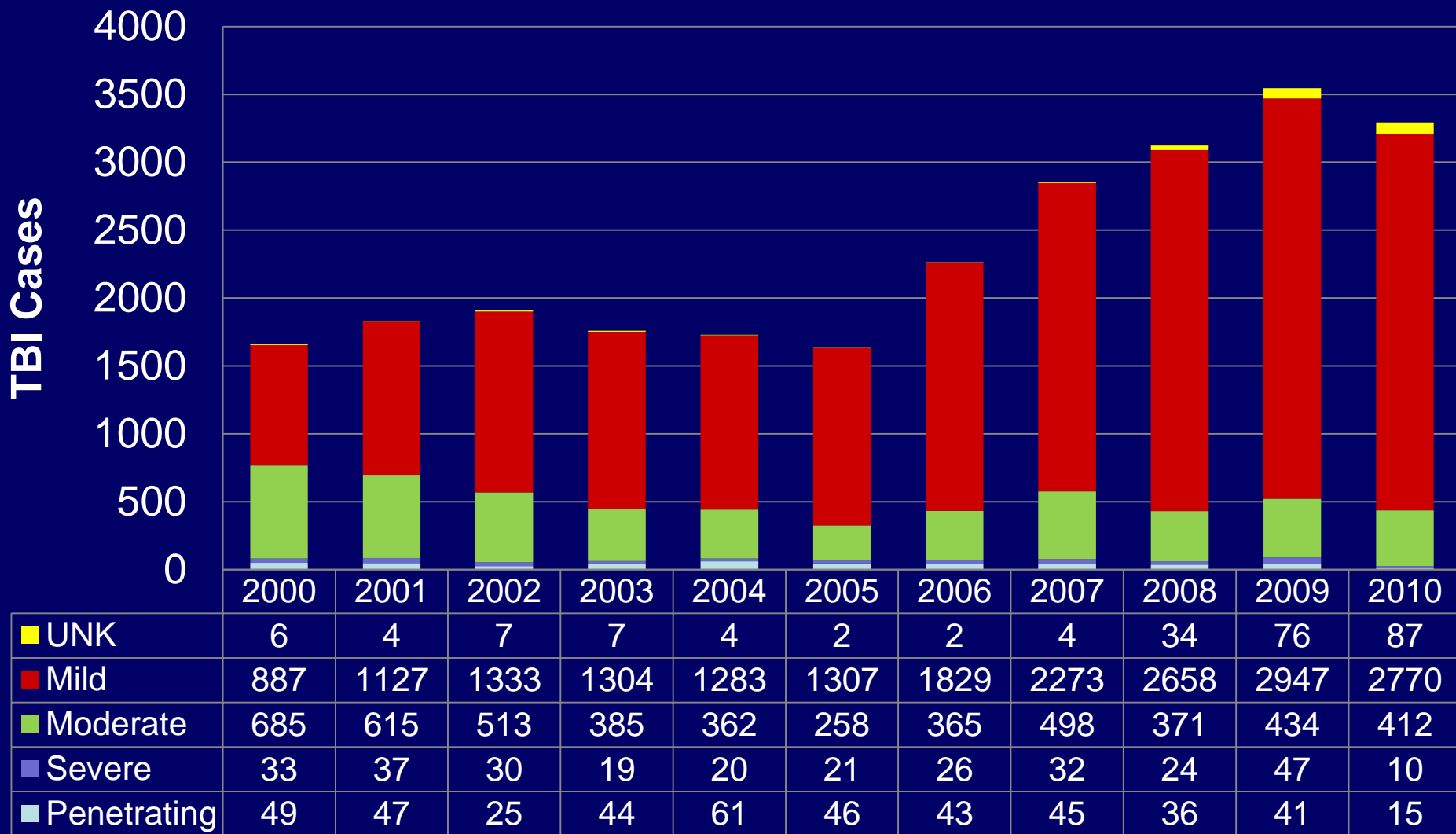


# Traumatic Brain Injury



# Traumatic Brain Injury

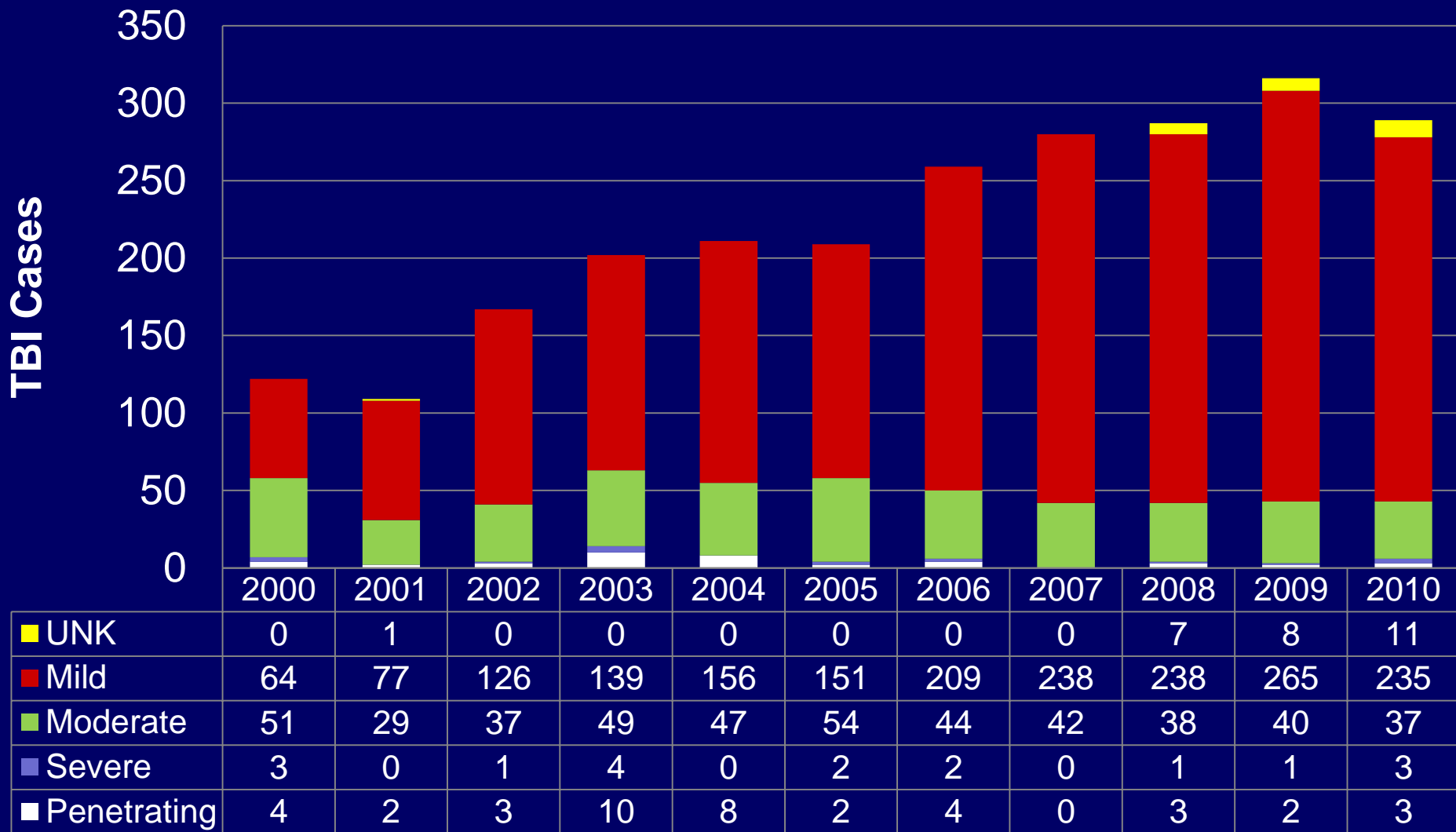
## Marines-Active Duty





# Traumatic Brain Injury

## Marines-Reserves



# Traumatic Brain Injury

Estimated Average Annual Number of TBI  
in the United States, 2002–2006



# Traumatic Brain Injury

## Prevention

- IED strategies
- Military Equipment
- Personal Protective Equipment
- Mandatory time-out
- Tactics, Techniques, Procedures

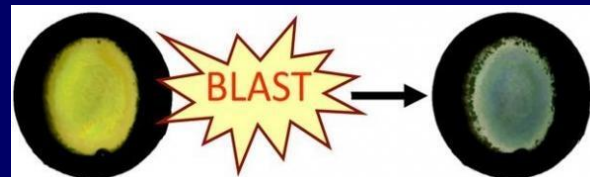




# Traumatic Brain Injury

## Recognition

- 50 meter blast exposure?
- MACE
- DTM
- Personal Dosimetry
- Biomarkers
- Neuroimaging
- NCAT



**Military Acute Concussion Evaluation (MACE)**  
Defense and Veterans Brain Injury Center

Patient Name: \_\_\_\_\_  
SS#: \_\_\_\_\_ Unit: \_\_\_\_\_  
Date of Injury: \_\_\_\_/\_\_\_\_/\_\_\_\_ Time of Injury: \_\_\_\_\_  
Examiner: \_\_\_\_\_  
Date of Evaluation: \_\_\_\_/\_\_\_\_/\_\_\_\_ Time of Evaluation: \_\_\_\_\_

History: (I – VIII)

I. **Description of Incident**  
Ask  
a) What happened?  
b) Tell me what you remember.  
c) Were you dazed, confused, "saw stars"?  Yes  No  
d) Did you hit your head?  Yes  No

II. **Cause of Injury** (Circle all that apply):  
1) Explosion/Blast 2) Blunt object 3) Motor Vehicle Crash 4) Fragment 5) Fall 6) Gunshot wound 7) Other \_\_\_\_\_

III. **Was a helmet worn?**  Yes  No Type \_\_\_\_\_

IV. **Amnesia Before:** Are there any events just BEFORE the injury that are not remembered? (Assess for continuous memory prior to injury)  
 Yes  No If yes, how long \_\_\_\_\_

V. **Amnesia After:** Are there any events just AFTER the injuries that are not remembered? (Assess time until continuous memory after the injury)  
 Yes  No If yes, how long \_\_\_\_\_

VI. **Does the individual report loss of consciousness or "blacking out"?**  Yes  No If yes, how long \_\_\_\_\_

VII. **Did anyone observe a period of loss of consciousness or unresponsiveness?**  Yes  No If yes, how long \_\_\_\_\_

VIII. **Symptoms** (circle all that apply):  
1) Headache 2) Dizziness 3) Memory Problems 4) Balance problems 5) Nausea/Vomiting 6) Difficulty Concentrating 7) Irritability 8) Visual Disturbances 9) Ringing in the ears 10) Other \_\_\_\_\_

07/2007 DVBIC.org 800-870-8244  
This form may be copied for clinical use. Page 1 of 8



**NCAT Performance Report**

Test Date: October 02, 2009 09:00  
MILITARY ACUTE CONCUSSION EVALUATION  
SERIES NUMBER: 00

**SUMMARY PERFORMANCE TRENDS**

Scale: 0-100 (0 = Worst, 100 = Best)

0-100	75-100	50-75	25-50	0-25
100%	75%	50%	25%	0%

BS: 00000000  
Name: SMITH, JOHN L  
Grade: O3E  
Service: OTHER DOD  
Mailing: SERVICE ACADEMY  
Age: 23 Gender: M Service: 10

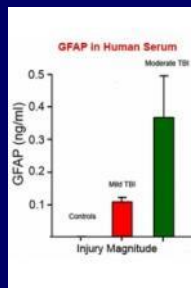
**EXPLANER**  
The information provided in this report does not represent medical advice, diagnosis, or a prescription for treatment. Providers should use these results in conjunction with a complete medical examination.

**REVIEW**  
Injury (cause): Resulting in: Symptoms Right after Injury: Nausea / vomiting, Balance problems / dizziness.  
Blot or in/night: None recorded. Symptoms Now After Injury: None recorded.

**PREVIEWER OBSERVATIONS**  
MOE: Initial: Between normal and previous injury.  
Any: Post Concussion

**PERFORMANCE AT A GLANCE**

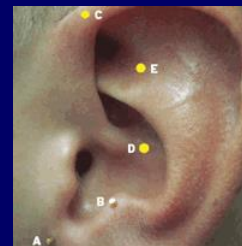
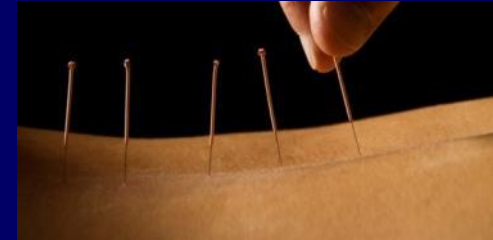
Scale Domain	Score	Reaction Time	Speed	Memory	Balance	Visual	Attention	Mood
Single Reaction Time	100	100	100	100	100	100	100	100
Single Reaction Time (2)	100	100	100	100	100	100	100	100
Precedence Reaction Time	100	100	100	100	100	100	100	100
Code Substitution - Learning (SPANNING)	100	100	100	100	100	100	100	100
Code Substitution - Delayed (DELAYED MEMORY)	100	100	100	100	100	100	100	100
Mathematical Processing (DEFINING MEMORY)	100	100	100	100	100	100	100	100
Reading to Sample (DEFINING MEMORY)	100	100	100	100	100	100	100	100



# Traumatic Brain Injury

## Treatment

- Evidence Based
- CPG
- Restoration Centers
- Medications
- Complementary Medicine
- Return to duty



**DEFENSE CENTERS OF EXCELLENCE**  
For Psychological Health & Traumatic Brain Injury

**Fact Sheet Summarizing VA/DoD Evidence Based Clinical Practice Guideline for MANAGEMENT OF CONCUSSION/MILD TRAUMATIC BRAIN INJURY**

This fact sheet summarizes the evidence based recommendations presented in the VA/DoD clinical practice guideline regarding management of concussion/mild traumatic brain injury.  
The full guideline is available at: [http://www.healthquality.va.gov/traumatization\\_of\\_Concussion\\_mTBI.asp](http://www.healthquality.va.gov/traumatization_of_Concussion_mTBI.asp)

DAILY EDUCATION	
Strongly recommended	Patients who sustain a concussion/mTBI should be provided with information and education about concussion/mTBI symptoms and recovery patterns as soon as possible after the injury. Education should be provided in printed material combined with verbal review and consist of: <ul style="list-style-type: none"> <li>• Normalizing symptoms education that current symptoms are expected and common after injury event (A)</li> <li>• Reassurance about expected positive recovery (A)</li> </ul>
Recommended	Patients who sustain a concussion/mTBI should be provided with information and education about concussion/mTBI symptoms and recovery patterns as soon as possible after the injury. Education should be provided in printed material combined with verbal review and consist of: <ul style="list-style-type: none"> <li>• Techniques to manage stress (e.g., sleep education, relaxation techniques, minimize consumption of alcohol, caffeine and other stimulants) (B)</li> </ul>
Recommended	Patients should be provided with written contact information and be advised to contact their healthcare provider for follow-up if their condition deteriorates or if symptoms persist for more than 4-6 weeks (B)
PATIENT EDUCATION/OUTPATIENT SERVICES	
No recommendation for or against	Self-reported symptomatology is an appropriate assessment of the patient's condition in concussion/mTBI when the history is consistent with having sustained an injury event and having a subsequent alteration in consciousness (C)
COGNITIVE SYMPTOMS	
Strongly recommended	All individuals who sustain a concussion/mTBI should be provided with information and education about concussion/mTBI symptoms and recovery patterns as soon as possible after the injury (A)
Recommended	If a pre-injury neurocognitive baseline was established in an individual case, then a post injury comparison may be completed by a psychologist but should be determined using reliable tools and test-retest stability should be ensured (B)
No recommendation for or against	A patient sustaining a concussion/mTBI should be evaluated for cognitive difficulties using a focused clinical interview (C)
Not recommended as routine intervention	Comprehensive neurocognitive testing is not recommended during the first 30 days post injury (B)
BEHAVIORAL SYMPTOMS	
Strongly recommended	Treatment of psychosocial/behavioral symptoms following concussion/mTBI should be based upon individual factors and nature and severity of symptom presentation and include psychotherapeutic treatment (A)
Insufficient evidence to make a recommendation	Treatment of psychosocial/behavioral symptoms following concussion/mTBI should be based upon individual factors and nature and severity of symptom presentation and include pharmacologic treatment (B)
Insufficient evidence to make a recommendation	Individuals who sustain a concussion/mTBI and present with anxiety symptoms and/or irritability should be provided reassurance regarding recovery and offered a several week trial of pharmacologic agents (B)

Version 1 September 2016

# Traumatic Brain Injury

## Data

- CIDNE/BECIR
- MRRS
- AHLTA
- VA
- Sharing
- Analysis

A screenshot of the "NCAT Entry/Update" web application. The interface includes a header with the MRRS logo and the title "NCAT Entry/Update". Below the header, there are tabs for "Member", "Activity", "NCAT", and "Status". The main content area is divided into several sections: "Baseline Neuropsychological Assessment" with fields for "Baseline Date" (01-Dec-2010), "Facility UIC" (00027), and "Facility Title" (RDGTRS USMC WASH DC); "Event Neuropsychological Assessment" with fields for "Event Date" (17-Dec-2010), "Performed Date" (17-Dec-2010), and "Outcome" (FAIL); and "MDR" (Medical Readiness Report) section with fields for "Name", "Facility", "Format", "Phone", "Email", and "DSN".A screenshot of the "Traumatic Brain Injury (TBI) Metrics" web application. The interface includes a header with the MRRS logo and the title "Traumatic Brain Injury (TBI) Metrics". Below the header, there are tabs for "Member", "Activity", "TBI", "ICD", "MDR", and "Status". The main content area is divided into several sections: "Event Details" with fields for "Event Date" (01-Jan-2011), "Type" (Closed Head Injury), "Location" (Training), and "Deployed" (Yes); "Mechanism Of Injury (MOI)" with checkboxes for "Explosion / Blast", "Projectile", "Head Impact", "Fall", "Training", "Motor Vehicle Accident", and "Injury Agent Other"; "Disposition" with checkboxes for "Further Evaluation Required", "Recommendations" (Limited Duty, Outpatient Support, Medical Board, Light Duty, Nursing Home, Community Trans Program, Medical Retirement), and "Disposition Date" (01-Jan-2011).



# Traumatic Brain Injury

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## Research

- Blast Patch
- Functional MRI
- Biomarkers
- Accelerometer
- Treatment
- Outcomes

# Traumatic Brain Injury

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## Longer Term Consequences

- Chronic Traumatic Encephalopathy
- Disability Evaluation System
- VA care
- Comorbid

# Traumatic Brain Injury

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## Way Forward

- Continue close coordination with DCOE/Navy Medicine
- Emphasize Prevention
- Immediate recognition and care
- Collect and analyze the data
- Research
- Develop evidence-based scientifically supported solutions
- Support the service member through all phases



# Questions?

