Neurological Findings & Symptoms Associated with Acute Combat–related Concussion:

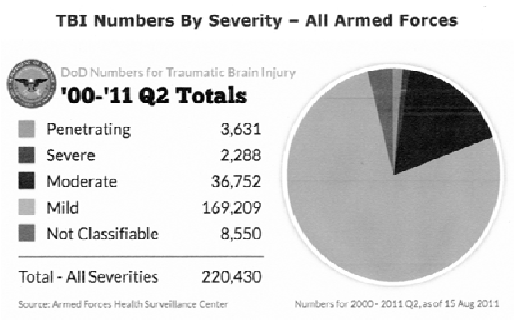
Impact of Migraine and Other Co-morbidities

COL Beverly R. Scott
Madigan Healthcare System

Disclosures

- The views expressed are those of the author and do not reflect the official policy of the Department of the Army, the Department of Defense or the U.S. Government.
- No commercial support.

Concussion/mTBI Among Returning Service Member



Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JUN 2012		**00-00-2012 to 00-00-2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Neurological Findings & Symptoms Associated With Acute Combat-Related Concussion:Impact Of Migraine And Other Co‐morbidities	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Madigan Healthcare System,Chief, Neurology Service,9040 Jackson Avenue,Tacoma,WA,98431**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

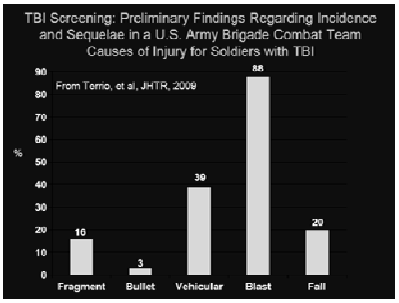
13. SUPPLEMENTARY NOTES
Presented at the American Headache Society's Annual Scientific Conference, Los Angeles, CA, June 20-24, 2012

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**13**	

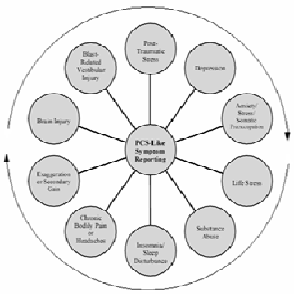
Causes of Concussion



Concussion - 4 Symptom Categories

- Physical (10)
  - Headache
  - Fatigue
  - Dizziness
  - Sensitivity to light and/or noise
  - Nausea/ vomiting
  - Balance problems
  - Numbness/ tingling
  - **Visual problems**
- Cognitive (4)
  - Difficulty remembering
  - Difficulty concentrating
  - Feeling slowed down
  - Feeling mentally foggy
- Emotional (4)
  - Irritability
  - Sadness
  - Feeling more emotional
  - Nervousness
- Sleep (4)
  - Drowsiness
  - Sleeping less than usual
  - Sleeping more than usual
  - Trouble falling asleep

Factors that Influence Reporting of Post-Concussion-Like Symptoms



From Iverson et al., 2009

Concussion in Deployed Setting Does NOT Occur in Isolation

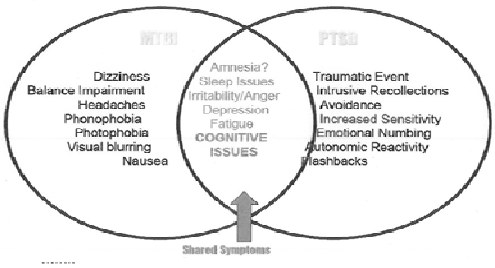
Co-morbid Conditions

- Concurrent Injuries
- Prior concussion(s)
- Acute Stress Reaction/PTSD
- Migraine
- Sleep Disorder
- Mood Disorder
- Chronic pain
- Medication misuse
- Substance abuse

Pre-morbid Factors

- Past experiences
- Perception of experience
- Coping Skills/ Resilience
- Combat Operational Stress (COSR)
- Psychosocial stressors
- Sleep impairment
- Personality (motivation)
- Expectations
- Unit Cohesion

MTBI and PTSD – Overlapping Conditions?



Flynn, Frederick . Combat Related mTBI and Co-morbidities, AAN 2010

Post-traumatic Headache (PTHA)

- HA onset within 7 days after trauma
- Most common post-concussive symptom (31-96%)
- Heterogeneoneous group , ± trauma related
- 70-96 % meet criteria for primary HA disorder
- Post-traumatic migraine common (28-60%); most common subtype in military (≈ 89%)
- Risk factors for chronic HA: females, prior HA, medication overuse, mild head trauma, migraine features
- Co-morbidities often present

Objectives

- Describe the clinical characteristics of a sample of SMs with concussion
  - Concussion symptoms
  - Acute and chronic co-morbidities
  - Association of co-morbidities with return to duty
  - Pre-deployment & Post-traumatic headache features
- Discuss the implications for clinicians
  - Importance of careful evaluation and symptom attribution to optimize care and recovery

Methods

- 40 Service Members with acute concussion evaluated and followed in theater by a neurologist
  - Average follow-up = 33 days (median 18 days)
  - Average visits = 4 (median 3)
- Reviewed and abstracted clinical records
- Calculated frequencies for concussion symptoms, acute and chronic co-morbidities
- Investigated characteristics of headaches, highlighting migrainous features
- Explored the association of co-morbidities with return to duty

Characteristics of the Study Population

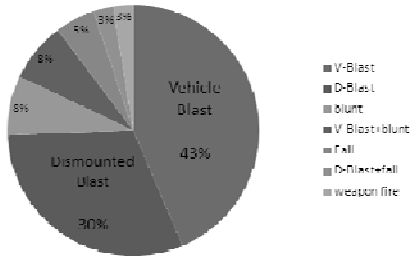
Neurological Findings in Concussion

N = 40

- Mean age: 29±9 years
- Gender
  - Male: 37 (92%)
  - Female: 3 (8%)
- Returned to duty
  - Full: 19 (50 %)
  - Limited: 10 (26 %)
  - Evacuated: 9 (24 %)
- Concussion Grade
  - Grade 1: 14 (35 %)
  - Grade 2: 21 (53 %)
  - Grade 3: 5 (12 %)
- h/o prior concussion
  - Recent : 19 (48%)
    - ≥ 3 past year: 9 (23%)
  - Remote: 8 (20%)

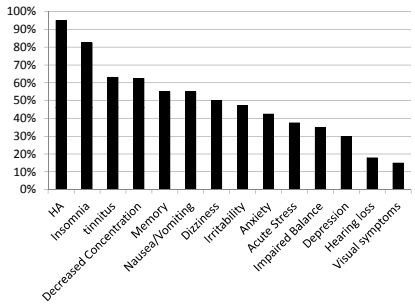
Mechanism of Injury

Neurological Findings in Concussion Study



Concussion Symptoms

Neurological Findings in Concussion



Co-morbid Conditions

Neurological Findings in Concussion

Acute

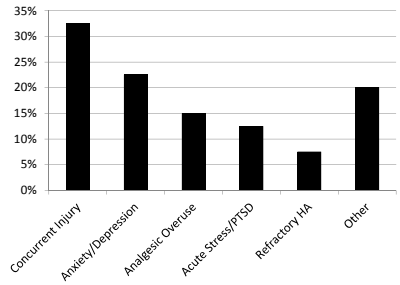
- Concurrent Injury
- Anxiety/ Depression
- Analgesic Overuse
- Acute Stress Reaction/PTSD
- Refractory Headaches
- Other

Chronic

- Anxiety/ Depression
- Analgesic Overuse
- PTSD
- Chronic stressors
- Headache
- Insomnia
- Musculoskeletal conditions
- Recurrent Concussion
- Recurrent Blast Exposure
- Other

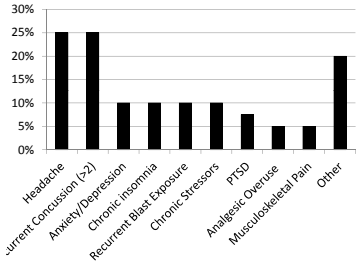
Acute Co-morbidities

Neurological Findings in Concussion



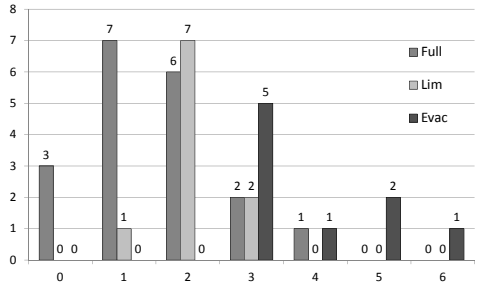
Chronic Co-morbidities

Neurological Findings in Concussion



Association of Number of Co-morbidities* with Return to Duty

Neurological Findings in Concussion Study



*Includes acute and chronic

Pre-deployment Headache History
N=40

- h/o migraine DX : 5 (**12.5%**)
- Known FH migraine : 10 (**25%**)
- Prior h/o of any headaches: 25 (62.5%)
  - *Presence of migrainous features or triggers: 21 (**52%**)*

Pre-deployment Headaches
n= 25

Frequency	Severity
"infrequent": 15 (60%)	• Mild - moderate: 6 (24%)
1-4/month : 7 (28%)	• **Mod-severe: 10 (40%)**
>4/month: 1 (4%)	• Unreported: 9 (36 %)
Unreported: 2 (8%)	

Headache Features & Triggers*

Typical migraine triggers: 9 (36%)
Typical migraine features : 8 (32%)
Childhood HAs w/ migrainous features: 1 (4%)
"Sinus HAs": 1 (4%) Motion Sickness: 1 (4%)
*** Presence of ≥ 1 of these features: 21 (84%)**

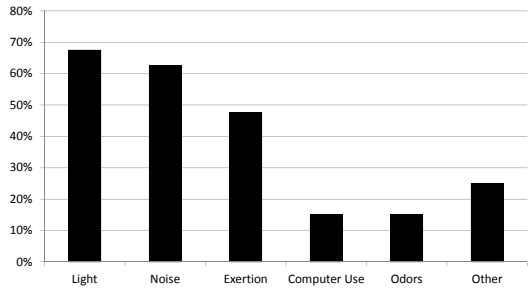
Post-traumatic Headaches
n= 38

Frequency	Severity
"infrequent": 2 (5.2%)	Mild-moderate: 10 (26%)
2-4/month: 2 (5.2%)	**Mod -severe: 28 (74%)**
1-6/week: 9 (23.5%)	
Daily: 26 (68%)	

Headache Features

Unilateral: 26 (68%)	Aura: 2 (5%)
Throbbing: 32 (84%)	Dizziness/Vertigo: 10 (26%)
Photophobia: 28 (74%)	Nausea/Vomiting: 25 (66%)
Phonophobia: 20 (53%)	Relief with sleep: 27 (71%)

Post-traumatic Headache Triggers n=38



Post-traumatic Headache Treatment n=38

- Abortive treatment
  - Triptan use : 16 (42%) *75% response rate*
  - NSAID use : 32 (84%) *81% response rate*
- Prophylaxis
  - Amitriptyline : 24 (63%)
  - Other: 2 (5%)
- All patients received headache/migraine education on potential triggers and lifestyle factors

Study Limitations

- Very small number of participants (statistical testing not possible)
- Findings may not be representative of all Service Members with concussion
- Data based on self-report and clinical impression

Conclusions

- Concussion in deployed settings does not occur in isolation. Co-morbidities are common.
- Presence of multiple co-morbidities appears to influence recovery ; more research is needed.
- Post-traumatic headaches often fully c/w migraine, potentially related to pre-deployment susceptibility as supported by detailed history. Acute post-traumatic migraine responds to appropriate therapy.
- Despite widespread screening and advances in technology, detailed clinical assessment remains the hallmark of successful diagnosis and management of concussion.

Knowledge Gaps, Challenges, and Future Research

- Is post-traumatic migraine generated by the same mechanisms as idiopathic migraine?
- How do we best care for Service Members with multiple co-morbidities?
- **Does migraine and other co-morbidities account for many of the symptoms attributed to acute concussion?**

Further clinical research required for co-morbidity recognition and management, including post-traumatic migraine.

We need a standardized data collection system to support rigorous prospective studies.

Acknowledgements

Statistical and epidemiologic support provided by

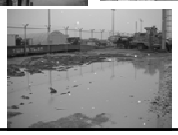
John A. Jones

Jean Langlois Orman, ScD, MPH

US Army Institute of Surgical Research

Fort Sam Houston, TX




Thankful for my experience…


… in gaining new perspectives

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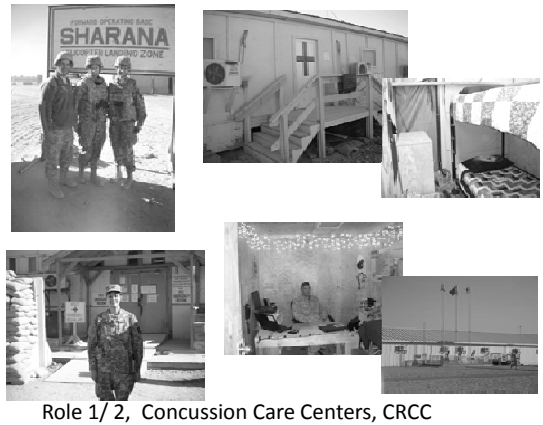
Role 3 Concussion Care Program, BAF 10/10-12/10

Theater Neurology Consultant Travel 10/10-4/11

Scenes of Afghanistan



Role 1/ 2, Concussion Care Centers, CRCC

Contact Information

COL Beverly R. Scott MD
Madigan Healthcare System
Chief, Neurology Service
9040 Jackson Avenue
Tacoma, WA 98431
beverly.scott1@us.army.mil
(253)968-1270