



**DEFENSE CENTERS  
OF EXCELLENCE**

For Psychological Health  
& Traumatic Brain Injury

**Today's webinar:**

**Progressive Return to Activity Following Acute Concussion/Mild Traumatic Brain Injury:  
Guidance for the Primary Care Manager and Rehabilitation Provider**

**March 13, 2014, 1-2:30 p.m. (EDT)**

**Presenters:**

**Michael McCrea, Ph.D. ABPP**

Professor of Neurosurgery and Neurology  
Director, Brain Injury Research  
Medical College of Wisconsin

Clement J. Zablocki VA Medical Center, Milwaukee, Wis.

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Office of Clinical Affairs,  
Division of Clinical Practice and Clinical Recommendations  
Contract support for Defense and Veterans Brain Injury Center, Silver Spring, Md.

**Moderator:**

**Maj. Tisha Bridge, PA-C, SP, U.S. Army**

Chief, Office of Education Outreach, Defense and Veterans Brain Injury Center, Silver Spring, Md.



# Webinar Details

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- Question-and-answer (Q&A) session
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The screenshot shows an Adobe Connect webinar window titled "DCoE TBI Webinar - Adobe Connect". The main content area displays the following information:

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

**Today's webinar:**  
**State of the Science: Clinical, Metabolic and Pathologic Effects of Multiple Concussions**  
January 16, 2014, 1-2:30 p.m. (EST)  
Moderator: Donald Marion, M.D., M.Sc.  
Clinical Affairs Senior Advisor  
Defense and Veterans Brain Injury Center  
Silver Spring, Md.

Logos for DVBIC, DHCC, and DCoE are visible at the bottom of the main content area.

The "Files for Download" section on the left is circled in red and contains the following table:

Name	Size
Back to School Guide to Academic Suc	1 MB
Neuroimaging Following mTBI Clinical	313 KB
Neuroendocrine Dysfunction Screening	268 KB
Disorders Associated with mTBI Refere	302 KB

Below the table is a "Save To My Computer" button. The "Web Links" section below it lists "DCoE Website", "DVbic Website", and "DHCC Website". A "Browse To" button is also present with the URL <https://ice.disa.mil/index.cfm?fa=c>.

# Continuing Education Details

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- The authority for training of contractors is at the discretion of the chief contracting official.
  - Currently, only those contractors with scope of work or with commensurate contract language are permitted in this training.
- All who registered **prior** to the deadline on **Thursday, March 13, 2014**, at 11 a.m. (EDT) and meet eligibility requirements stated above, are eligible to receive a certificate of attendance or CE credit.

# Continuing Education Details (continued)

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# Webinar Overview

- Consensus panels have increasingly recommended a gradual return to normal activity using a graded protocol after a concussion. In January 2014, the Defense and Veterans Brain Injury Center released two companion clinical recommendations to facilitate a standardized, staged return to unrestricted activity for service members who have sustained concussion in deployed and non-deployed settings.
- The “Progressive Return to Activity Following Acute Concussion/Mild Traumatic Brain Injury: Guidance for the Primary Care Manager and the Rehabilitation Provider in Deployed and Non-deployed Setting” resource suite was developed in collaboration with military, clinical and academic subject matter experts. It addresses the six stages of progression from rest to pre-injury activity; definition of rest; use of the Neurobehavioral Symptom Inventory to track symptoms; a two-tiered complementary approach based upon symptoms and provider judgment; physical, cognitive and vestibular/balance activities recommended for participation and activities to avoid at each stage; and guidelines for progression, regression and referral. This webinar will introduce these key stages delineated by the clinical recommendations.
- At the conclusion of this webinar, participants will be able to:
  - Discuss the evolution toward evidence-based approaches to graded return to activity after concussion
  - Describe the standardized, staged approach for increasing physical and cognitive activities to optimize recovery
  - Identify progressive return to activity clinical recommendations, clinical support tools and patient education dissemination plan in the primary care or rehabilitation setting
  - Evaluate the concussed patient's progression through the stages of recovery and when the patient should be referred for further evaluation

# Presenter: Michael McCrea, Ph.D., ABPP

- Professor of neurosurgery and neurology, and director of brain injury research at the Medical College of Wisconsin; also neuroscientist at the Clement Zablocki Department of Veterans Affairs (VA) Medical Center in Milwaukee, Wis.
- American Board of Clinical Neuropsychology-certified in clinical neuropsychology and immediate past president of the American Academy of Clinical Neuropsychology
- Led several large, multi-center studies on the effects of traumatic brain injury (TBI) and sport-related concussion, including the National Collegiate Athletic Association Concussion Study; served on board of directors for the Center for Study of Retired Athletes at the University of North Carolina at Chapel Hill since its inception in 2001 and has co-authored multiple publications from research on the acute and chronic effects of concussion
- Authored numerous scientific publications, book chapters, and national and international lectures on the topic of TBI, including the text *Mild Traumatic Brain Injury and Postconcussion Syndrome: The New Evidence Base for Diagnosis and Treatment* published by Oxford University Press

# The Role of Rest and Graded Exertion in Concussion Management:

## *Lessons Learned from Sports Concussion Research and Practice*

**Michael McCrea, Ph.D., ABPP**

Professor and Director of Brain Injury Research  
Departments of Neurosurgery and Neurology  
Medical College of Wisconsin  
Milwaukee, Wis.

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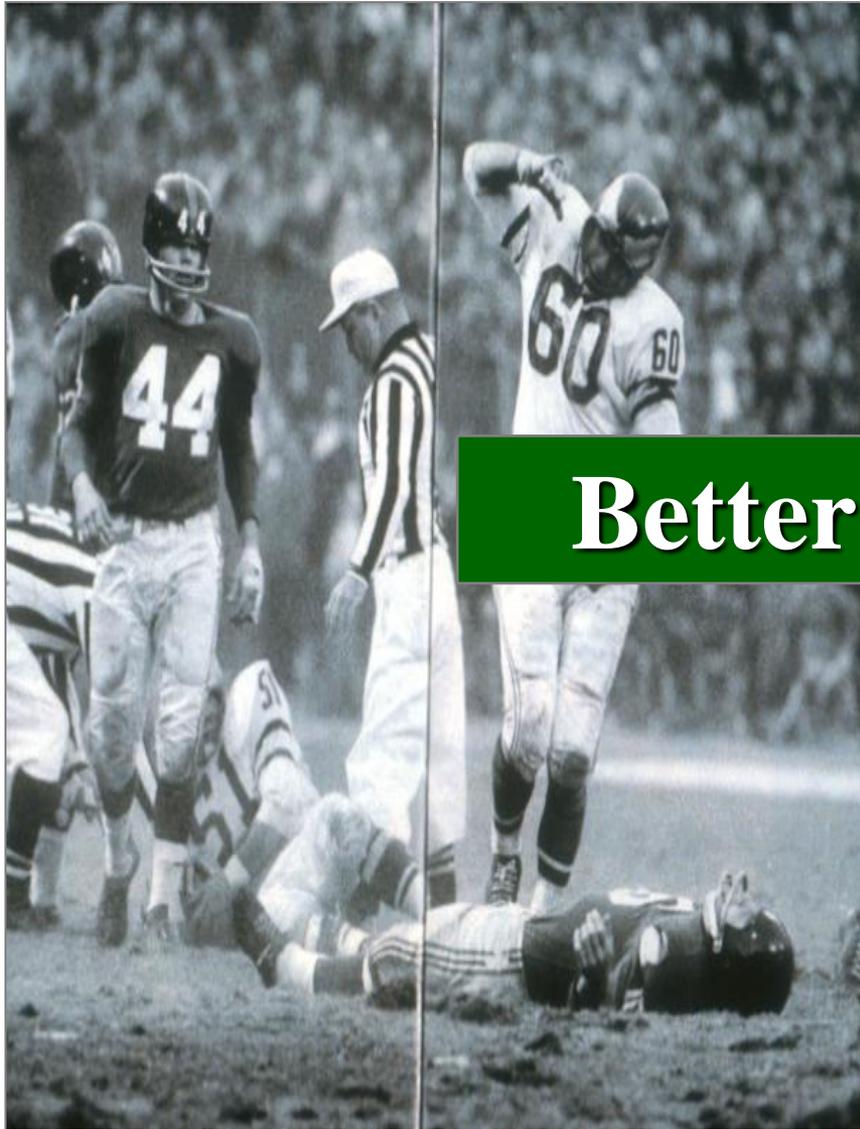
# Disclaimer

The views expressed in this presentation are my own and do not reflect official policy of the Medical College of Wisconsin or the VA.

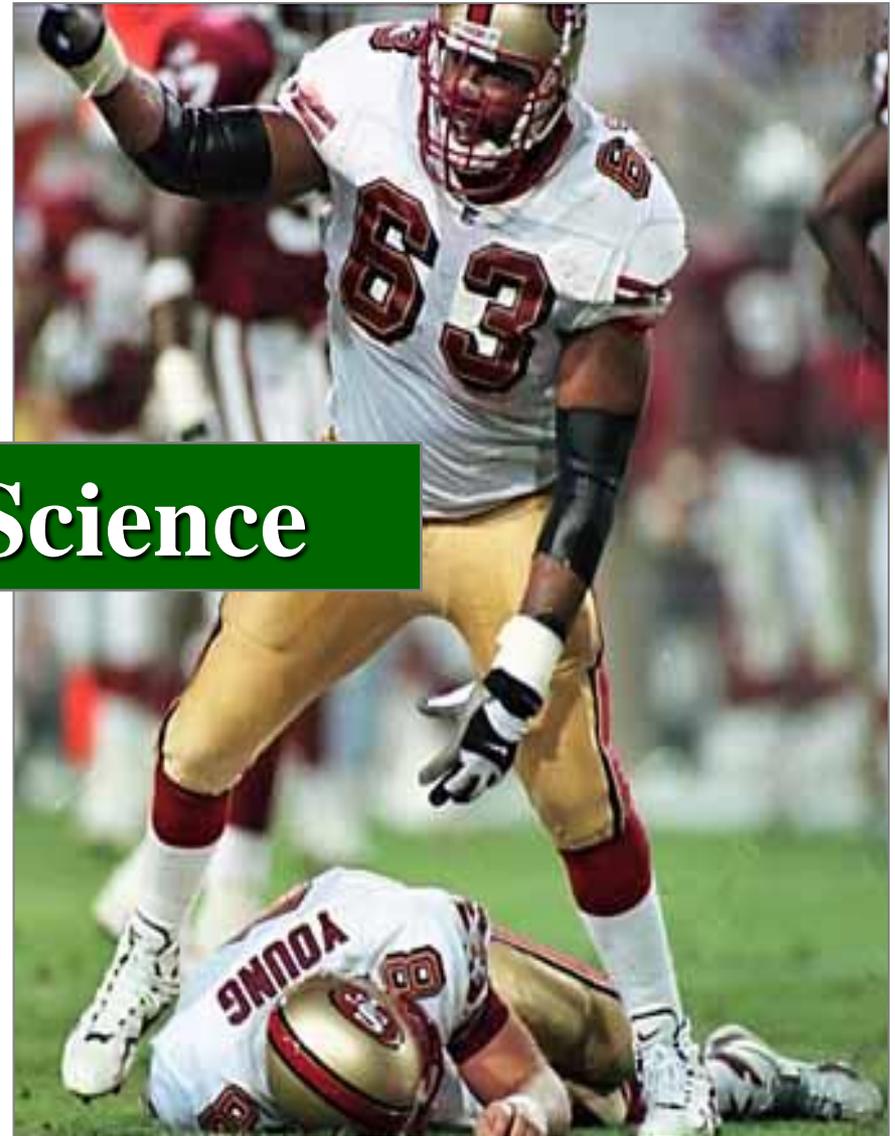
I have no relevant financial relationships to disclose.

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# Old Problem



# New Awareness



# Better Science

Photo Courtesy: John G. Zimmerman/Sports Illustrated

Photo Courtesy: Lenny Ignelzi/AP Photo

# Borrowing from Lessons Learned

## CONSENSUS STATEMENT

### Consensus Statement on Concussion in Sport—the 4<sup>th</sup> International Conference on Concussion in Sport Held in Zurich, November 2012

*Paul McCrory, MBBS, PhD, Willem Meeuwisse, MD, PhD, Mark Aubry, MD, Bob Cantu, MD, Jiri Dvorak, MD, Ruben J. Echemendia, PhD, Lars Engebretsen, MD, PhD, Karen Johnston, MD, PhD, Jeffrey S. Kutcher, MD, Martin Rafferty, MBBS, Allen Sills, MD, and*  
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Published Ahead of Print on March 18, 2013 as 10.1212/WNL.0b013e31828d57dd  
SPECIAL ARTICLE



### Summary of evidence-based guideline update: Evaluation and management of concussion in sports

Report of the Guideline Development Subcommittee of the American Academy of Neurology

#### ABSTRACT

**Objective:** To update the 1997 American Academy of Neurology (AAN) practice parameter regarding sports concussion, focusing on 4 questions: 1) What factors increase/decrease concussion risk? 2) What diagnostic tools identify those with concussion and those at increased risk for severe/prolonged early impairments, neurologic catastrophe, or chronic neurobehavioral impairment? 3) What clinical factors identify those at increased risk for severe/prolonged early postconcussion impairments, neurologic catastrophe, recurrent concussions, or chronic neurobehavioral impairment? 4) What interventions enhance recovery, reduce recurrent concussion risk, or diminish long-term sequelae? The complete guideline on which this summary is based is available as an online data supplement to this article.

**Methods:** We systematically reviewed the literature from 1955 to June 2012 for pertinent evidence. We assessed evidence for quality and synthesized into conclusions using a modified Grading of Recommendations Assessment, Development and Evaluation process. We used a modified Delphi process to develop recommendations.

**Results:** Specific risk factors can increase or decrease concussion risk. Diagnostic tools to help identify individuals with concussion include graded symptom checklists, the Standardized Assessment of Concussion, neuropsychological assessments, and the Balance Error Scoring System. Ongoing clinical symptoms, concussion history, and younger age identify those at risk for postconcussion impairments. Risk factors for recurrent concussion include history of multiple concussions, particularly within 10 days after initial concussion. Risk factors for chronic neurobehavioral impairment include concussion exposure and APOE ε4 genotype. Data are insufficient to show that any intervention enhances recovery or diminishes long-term sequelae postconcussion. Practice recommendations are presented for preparticipation counseling, management of suspected concussion, and management of diagnosed concussion. **Neurology**® 2013;•••

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American Academy of Neurology:

## How Does the Science Drive Best Practice?

# Scientific Advances in Sport-related Concussion (SRC): *Acute Effects and Recovery*

## RECOVERY and RETURN TO PLAY (RTP)

### Acute Effects and Recovery Time Following Concussion in Collegiate Football Players The NCAA Concussion Study

Michael McCrea, PhD

Kevin M. Guskiewicz, PhD, ATC

Stephen W. Marshall, PhD

William Barr, PhD

Christopher Randolph, PhD

Robert C. Cantu, MD

James A. Onate, PhD, ATC

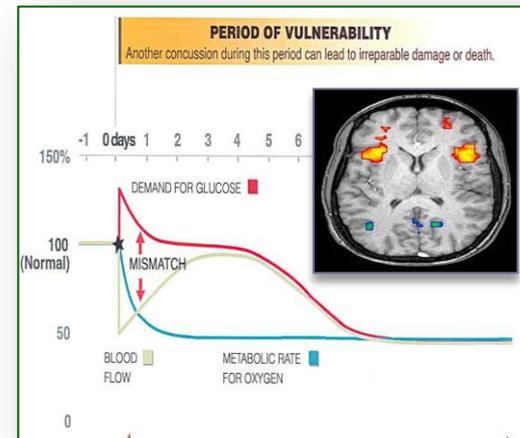
Jingzhen Yang, MPH

James P. Kelly, MD

**Context** Lack of empirical data on recovery time following sport-related concussion hampers clinical decision making about return to play after injury.

**Objective** To prospectively measure immediate effects and natural recovery course relating to symptoms, cognitive functioning, and postural stability following sport-related concussion.

**Design, Setting, and Participants** Prospective cohort study of 1631 football players from 15 US colleges. All players underwent preseason baseline testing on concussion assessment measures in 1999, 2000, and 2001. Ninety-four players with concussion (based on American Academy of Neurology criteria) and 56 noninjured controls underwent assessment of symptoms, cognitive functioning, and postural stability immediately, 3 hours, and 1, 2, 3, 5, 7, and 90 days after injury.



### Clinical Recovery:

How long does it take for signs and symptoms to recover?

### Window of Vulnerability:

How long does the *brain* take to recover?

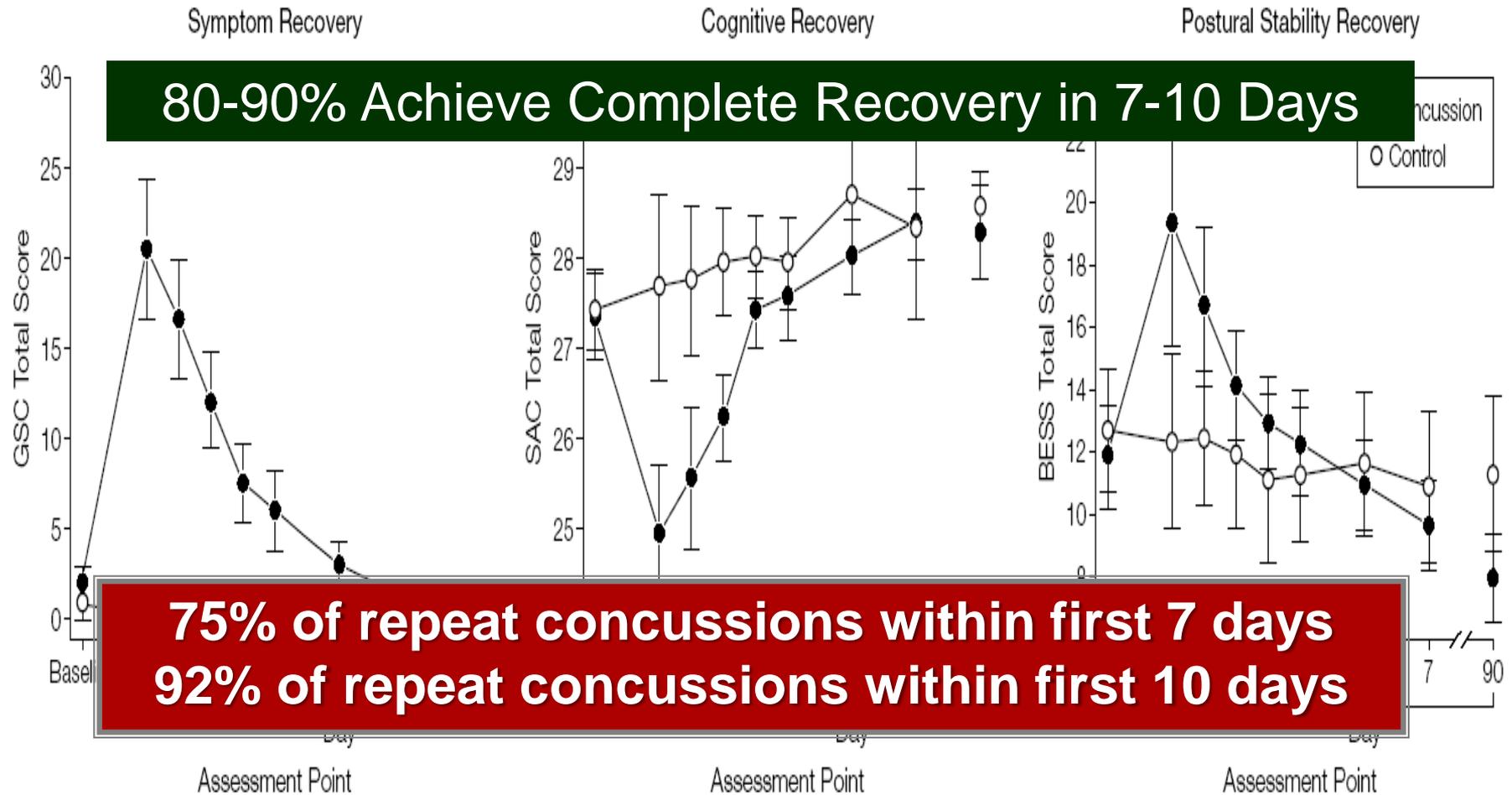
*Driving Evidence-based Diagnosis, Assessment and Management*

# Is Symptom Recovery Really *Recovery*?

<b>Rate of Post-injury Recovery in High School and College Athletes (n=790)</b>	<b>Total (%)</b>	<b>Cumulative Total (%)</b>
Rapid (< 1 day)	21.1	21.1
Gradual (> 1 day, < 7 days)	64.3	85.4
Prolonged (1 week – 1 month)	11.9	97.3
Persistent (> 1 month)	2.7	100.0

**Importance of Performance-based Measures of Recovery**

# How Long Does It Take to Recover?

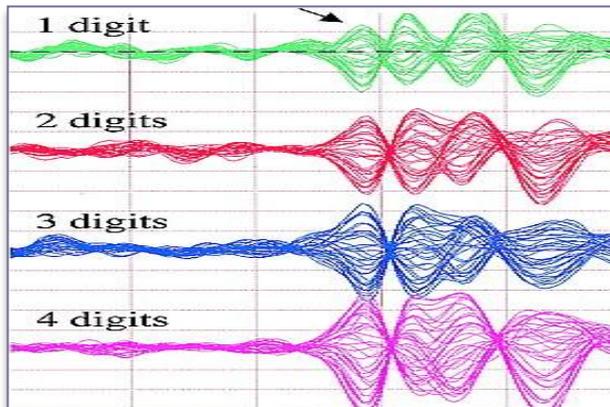
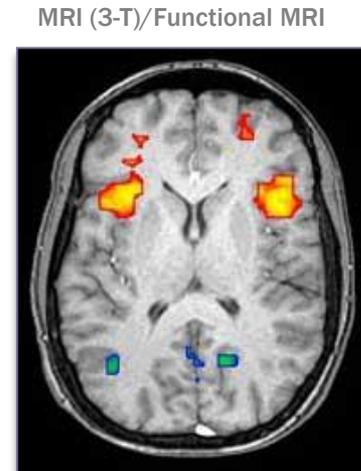
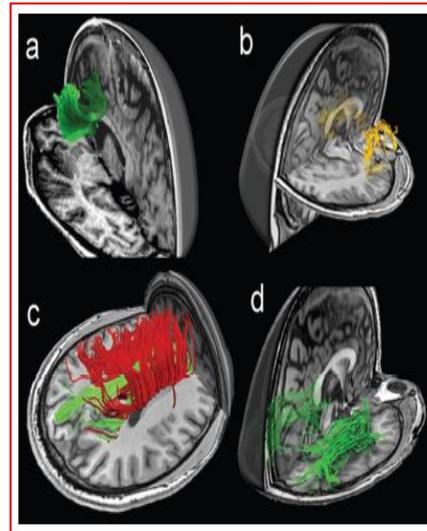
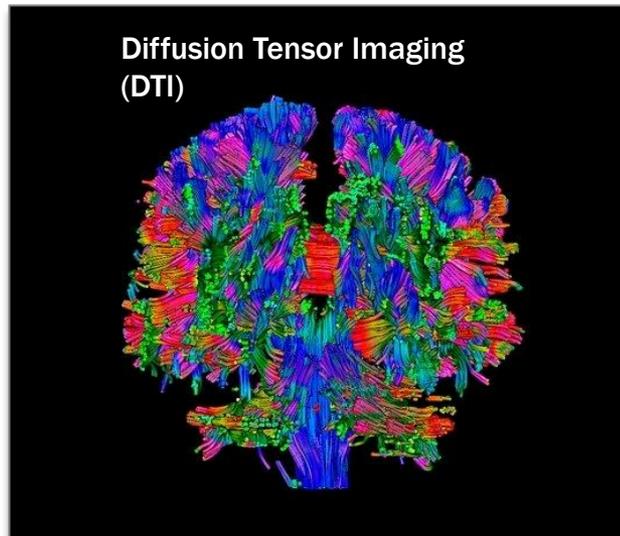


(McCrea et al., 2003, p. 2559)

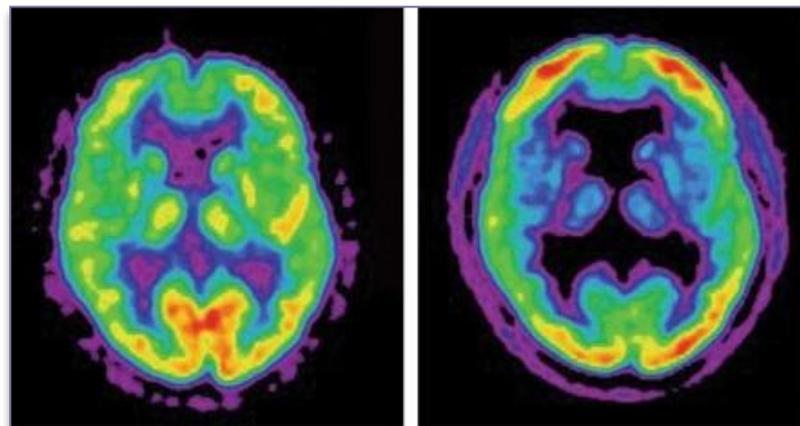
## RTP: How Long is Long Enough?

# When is the Brain Recovered?

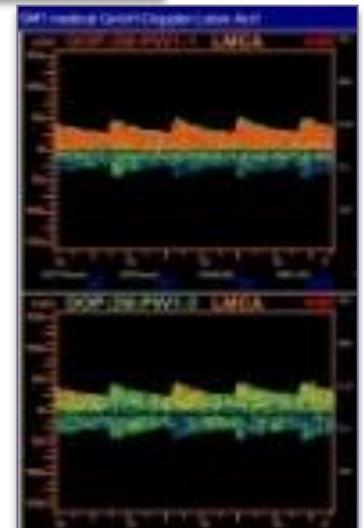
## *Quest for the Perfect “Biomarker”*



Magneto Encephalography (MEG) Scanner

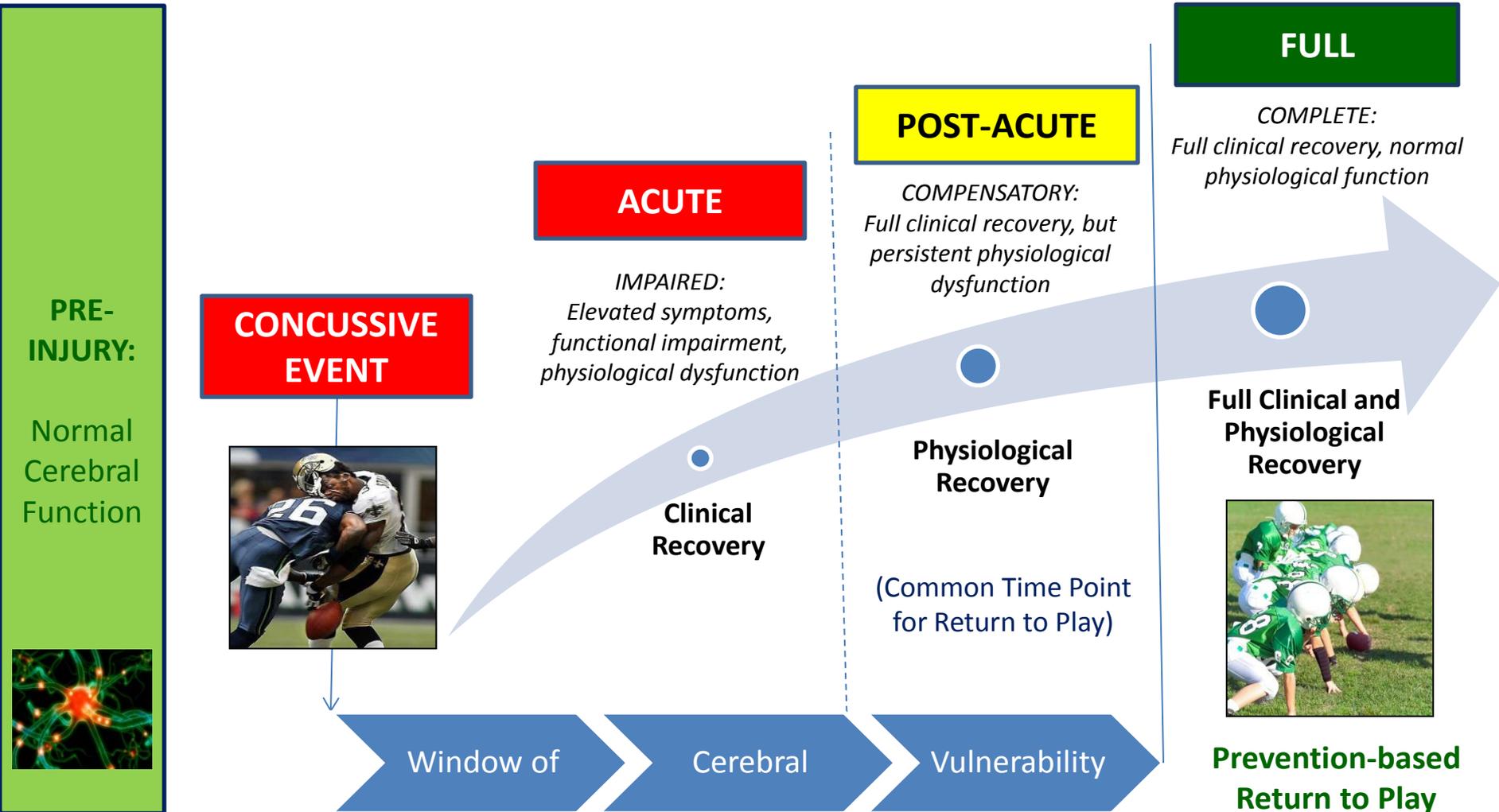


Positron Emission Tomography with Computed Tomography (PET/CT)



Trans-Cranial Doppler Ultrasound 17

# Integrated Recovery Model



## How Long is Long Enough?



4<sup>th</sup>

International  
Consensus  
Conference on

# Concussion in Sport

FIFA

For the Game. For the World.



## Cornerstone of Injury Management

## Graded Exertion and RTP

**Table 1** Graduated return to play protocol

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Symptom limited physical and cognitive rest	Recovery
2. Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity <70% maximum permitted heart rate No resistance training	Increase HR
3. Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities	Add movement
4. Non-contact training drills	Progression to more complex training drills, eg, passing drills in football and ice hockey May start progressive resistance training	Exercise, coordination and cognitive load
5. Full-contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	

# **Current Recommendations for the Diagnosis and Treatment of Concussion in Sport: A Comparison of Three New Guidelines**

“Currently, there is considerable debate within the sports medicine community about the role of concussion and the risk of chronic neurological sequelae. This concern has led to significant confusion among primary care providers and athletic trainers about how to best identify those athletes at risk and how to treat those with concussion. During the first quarter of 2013, several new or updated clinical practice guidelines and position statements were published on the diagnosis, treatment, and management of mild traumatic brain injury/concussion in sports. Three of these guidelines were produced by the American Medical Society for Sports Medicine, The American Academy of Neurology, and the Zurich Consensus working group. The goal of each group was to clearly define current best practices for the definition, diagnosis, and acute and post-acute management of sports-related concussion, including specific recommendations for return to play. In this article, we compare the recommendations of each of the three groups, and highlight those topics for which there is consensus regarding the definition of concussion, diagnosis, and acute care of athletes suspected of having a concussion, as well as return-to-play recommendations.”

# **Is Rest After Concussion “The Best Medicine?”: Recommendations for Activity Resumption Following Concussion in Athletes, Civilians, and Military Service Members**

## **CONCLUSION**

“The best available evidence suggests that complete rest exceeding 3 days is probably not helpful, gradual resumption of preinjury activities should begin as soon as tolerated (with the exception of activities that have a high mTBI exposure risk), and supervised exercise may benefit patients with persistent symptoms.”

# References

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- McCrea, M., Guskiewicz, K., Marshall, S., Barr, W., Randolph, C., Cantu, R., Onate, J., ...Kelly, J. (2003). Acute Effects and Recovery Time Following Concussion in Collegiate Football Players: The NCAA Concussion Study. *The Journal of the American Medical Association*, 290(19), 2556-2563. doi:10.1001/jama.290.19.2556
- McCrory, P. , Meeuwisse, W., Aubry, M., Cantu, B., Dvorak, J., Echemendia, R., Enggebretsen, L., ...Turner, M. (2013). Consensus Statement on Concussion in Sport – the 4th International Conference on Concussion in Sport Held in Zurich, November 2012. *British Journal of Sports Medicine*, 47(5), 250-258. doi:10.1097/JSM.0b013e31828b67cf

# References

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- West, T.A., & Marion, D.W. (2014). Current recommendations for the diagnosis and treatment of concussion in sport: a comparison of three new guidelines. *Journal of Neurotrauma*, 31(2), 159-168. doi:10.1089/neu.2013.3031

# Presenter: Therese A. West, DNP, APRN, FNP-C, CPN-BC

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- Provides contract support as a subject matter expert in the division of Clinical Practice and Clinical Recommendations in the Office of Clinical Affairs at the Defense and Veterans Brain Injury Center (DVBIC)
- Holds doctorate degree in nursing practice (DNP) and is nationally certified as a Family Nurse Practitioner (FNP) as well as a Certified Pediatric Nurse (CPN)
- As project action officer for the DVBIC working group, Dr. West led the team that developed Progressive Return to Activity Following Acute Concussion/Mild Traumatic Brain Injury: Guidance for the Primary Care Manager and Rehabilitation Provider
- Defined and developed health care guidance in the form of clinical recommendations and clinical support tools for the military as well as authored knowledge translation articles for publication



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# Progressive Return to Activity Following Acute Concussion/Mild Traumatic Brain Injury

## Guidance for the Primary Care Manager and Rehabilitation Provider in Deployed and Non-deployed Settings

**Therese A. West, DNP, APRN, FNP-C, CPN-BC**

Office of Clinical Affairs

Division of Clinical Practice and Clinical Recommendations  
Contract support for Defense and Veterans Brain Injury Center

Silver Spring, Md.



# Disclaimer

- The views expressed in this presentation are my own and do not reflect official policy of the U.S. Army, Defense Department or the U.S. government.
- I have no relevant financial relationships to disclose.
- I do not intend to discuss the off-label/ investigative (unapproved) use of commercial products or devices.

# Learning Objectives

Describe the role of these clinical recommendations (CRs) and overall goal for recovery following acute mild traumatic brain injury (mTBI)

Identify the three domains for graded activity progression through five stages

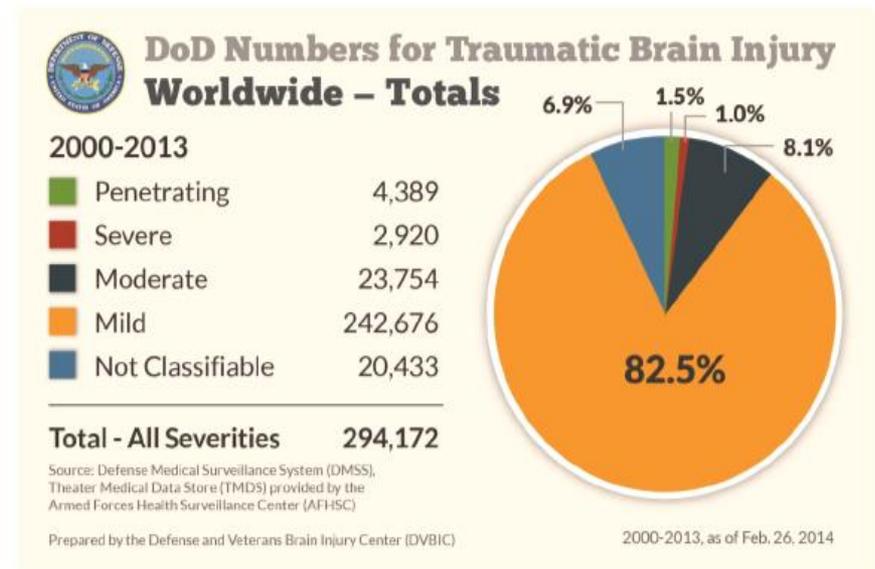
Understand the goal of each stage and identify minimum rest requirements

Recognize the objective and subjective measures for progression

Identify the recommended criteria for referral from the Primary Care Manager (PCM) to the Rehabilitation Provider (RP)

# Concussion/mTBI

- With more than 294,000 TBIs in the Defense Department from 2000 through 2013, TBI is a major concern that can negatively impact service members' health, unit readiness and mission accomplishment
- Majority of documented brain injuries (82.5%) in Defense Department are mTBIs, also known as concussion



(Defense and Veterans Brain Injury Center, 2014)

# CR Background

- Concussion Care Centers in Afghanistan reported three different progressive return to activity protocols
- Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury (DCoE) and its Center, DVBIC, were requested to assist in the development of an evidence-based standard approach to a graded return to activity
- Existing clinical practice guidelines (CPGs) and literature were reviewed

# CR Background

- Although there are consistent, evidence-based recommendations for rest and graded, gradual return to activity following concussion, no one source offered specific recommendations concerning:
  - A description of “rest”
  - What activities are recommended at specific time frames following injury
  - What activities should be avoided at specific time frames following injury
  - How to determine when an individual may “progress”

# CR Background

- Working group established including representation from all services, the VA, academic and research experts
- Combined the latest research with existing CPGs and expert recommendations
- CR products were developed and reviewed by all representatives
- Cross-walked with Defense Department and service-specific policies
- Consistent with theater and garrison concussion management algorithms (CMAs)

# Progressive Return to Activity Following Acute Concussion/Mild TBI

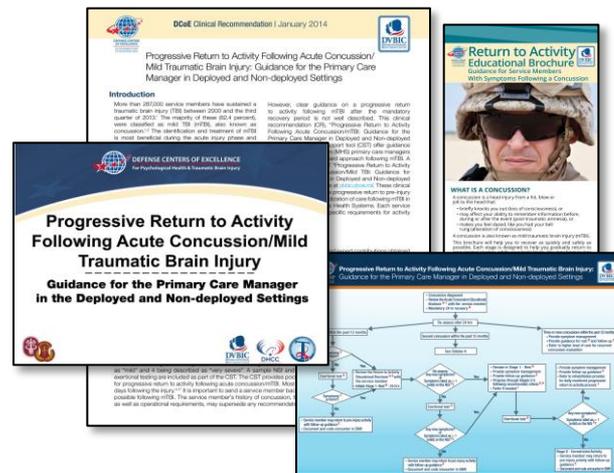
The Progressive Return to Activity clinical recommendations provide primary care managers and rehabilitation providers with guidance regarding how service members can incrementally return to pre-injury activity following an acute concussion. The two detail:

- Education interventions after diagnosis
- The parameters for physical and cognitive rest
- A standardized, staged approach for increasing physical and cognitive activities to optimize recovery
- Recommendations for progression, regression and referral

To download or order hard copies, visit [dvbic.dcoe.mil/resources/progressive-return-to-activity](http://dvbic.dcoe.mil/resources/progressive-return-to-activity)

## PRIMARY CARE MANAGER SUITE

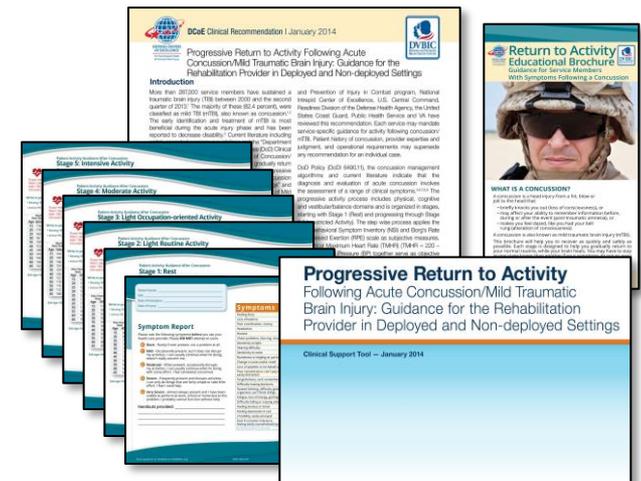
This suite of tools provides an initial framework for gradually increasing service member activity after concussion.



## REHABILITATION PROVIDER SUITE

This suite of tools is for more symptomatic service members referred by primary care managers to rehabilitation providers.

Each suite includes:  
 Clinical guidance  
 Clinical support tool  
 Provider educational slide deck  
 Patient education products



# General Principles

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These CRs:

- Interface with theater and garrison CMAs
- Provide six stages of progression from rest to pre-injury activity
- Utilize the Neurobehavioral Symptom Inventory (NSI) for evaluating symptoms
- After an education intervention for all patients, those with few and mild symptoms are managed by a PCM and follow a self-guided staged recovery

# General Principles

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These CRs:

- List key activities for participation and activities to avoid at each stage
- Require a regression to the previous stage for one day if there is any increase in the number or severity of symptoms
- Patients who are more symptomatic or who fail to progress are referred to Rehabilitation Providers for a more intensive, clinician-directed daily monitored recovery
- Give guidelines for progression, regression and referral

# General Principles

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These CRs DO NOT:

- Replace existing CMAs
- Provide guidelines for specific symptom management

# Stages of Progressive Activity

Rehabilitation Stages	Description
Stage 1	Rest
Stage 2	Light Routine Activity
Stage 3	Light Occupation-oriented Activity
Stage 4	Moderate Activity
Stage 5	Intensive Activity
Stage 6	Unrestricted Activity

# Comparison of the Two CRs

## Primary Care Manager CR

- Provides guidance for the progressive return to pre-injury activity in the uncomplicated mTBI patient population
- Relies heavily on patient education via a brochure to enable the service member to self-guide through the progressive activity
- Applies only to the service member with first or second concussion in 12 months who describes symptoms as no greater than “mild” (0-1) on the NSI

## Rehabilitation Provider CR

- Provides daily guidance for RPs in the progressive return to pre-injury activity in the complex mTBI patient population
- Progression is guided by rehabilitation specialists
- Provides physiological parameters (blood pressure and resting heart rate) to monitor and safely progress the service member through the progressive activity

# Comparison of the Two CRs

Primary Care Manager CR	Rehabilitation Provider CR
<p data-bbox="59 396 421 439">First Concussion:</p> <ul data-bbox="59 482 973 986" style="list-style-type: none"><li data-bbox="59 482 973 696">▪ Provides an option to return the service member to pre-injury activity if asymptomatic following stage 24 or 48 hours of rest</li><li data-bbox="59 768 973 986">▪ Recommends a minimum of four additional days of rehabilitation if symptoms have not cleared in 48 hours and allows for provider clinical judgment</li></ul> <p data-bbox="59 1075 749 1118">Second concussion in 12 months:</p> <ul data-bbox="59 1160 973 1253" style="list-style-type: none"><li data-bbox="59 1160 973 1253">▪ If symptoms reported as 2 or greater recommended referral to RP</li></ul>	<p data-bbox="973 382 1779 425">Is initiated for the service member who:</p> <ul data-bbox="973 468 1870 1025" style="list-style-type: none"><li data-bbox="973 468 1870 682">▪ Remains moderately or severely symptomatic after first or second concussion and describes symptoms as a 2 or greater on the NSI</li><li data-bbox="973 753 1870 853">▪ Is symptomatic after Stage 5: Intensive Activity, exertional testing</li><li data-bbox="973 925 1870 1025">▪ Is referred from PCM per clinical judgment</li></ul>

# Neurobehavioral Symptom Inventory (NSI)

- 22 item inventory of non-specific but common mTBI symptoms
- Symptoms are reported on a scale of 0 to 4:
  - 0 = none
  - 1 = mild
  - 2 = moderate
  - 3 = severe
  - 4 = very severe
- NSI becomes part of the medical record

**Neurobehavioral Symptom Inventory (NSI)**

Please rate the following symptoms. The purpose of this inventory is to track symptoms over time. Use the 0-4 scale below to rate the symptoms. Do not attempt to score.

0 **None** — rarely, if ever, present; not a problem at all.

1 **Mild** — occasionally present, but it does not disrupt my activities; I can usually continue what I'm doing; doesn't really concern me.

2 **Moderate** — often present, occasionally disrupts my activities; I can usually continue what I'm doing with some effort; I feel somewhat concerned.

3 **Severe** — frequently present and disrupts activities; I can only do things that are fairly simple or take little effort; I feel I need help.

4 **Very Severe** — almost always present and I have been unable to perform at work, school or home due to this problem; I probably cannot function without help.

SYMPTOMS	0	1	2	3	4
Feeling dizzy	0	1	2	3	4
Loss of balance	0	1	2	3	4
Poor coordination, clumsy	0	1	2	3	4
Headaches	0	1	2	3	4
Nausea	0	1	2	3	4
Vision problems, blurring, trouble seeing	0	1	2	3	4
Sensitivity to light	0	1	2	3	4
Hearing difficulty	0	1	2	3	4
Sensitivity to noise	0	1	2	3	4
Numbness or tingling on parts of the body	0	1	2	3	4
Change in taste and/or smell	0	1	2	3	4
Loss or increase of appetite	0	1	2	3	4
Poor concentration, can't pay attention, easily distracted	0	1	2	3	4
Forgetfulness, can't remember things	0	1	2	3	4
Difficulty making decisions	0	1	2	3	4
Slowed thinking, difficulty getting organized, can't finish things	0	1	2	3	4
Fatigue, loss of energy, tire easily	0	1	2	3	4
Difficulty falling or staying asleep	0	1	2	3	4
Feeling anxious or tense	0	1	2	3	4
Feeling depressed or sad	0	1	2	3	4
Easily annoyed, irritable	0	1	2	3	4
Poor frustration tolerance, feeling easily overwhelmed	0	1	2	3	4

Cicerone, KD. Journal of Head Trauma Rehabilitation 1995;10(2):1-17.

(Cicerone, 1995)

# Role of the PCM

## Diagnosed and confirmed concussion:

1. Provide mandatory recovery
  - 24 hours for first or second concussion within 12 months
2. For three or more concussions within 12 months refer to higher level of care for recurrent concussion evaluation
3. Provide education
  - Acute Concussion (mTBI) Educational Brochure
  - Return to Activity Educational Brochure
4. Initiate the progressive return to activity process OR refer to rehabilitation provider for daily monitored progressive return to activity process

All concussions should be evaluated in accordance with *Department of Defense Instruction (DoDI) 6490.11*; or the *VA/DoD Clinical Practice Guidelines for Management of Concussion/Mild Traumatic Brain Injury*

# Superscripts on Clinical Support Tool for Initial Steps



## Progressive Return to Activity Following Acute Concussion/Mild Traumatic Brain Injury: Guidance for the Primary Care Manager in Deployed and Non-deployed Settings



- Concussion diagnosed
- Review the Acute Concussion Educational Brochure **A-1** with the service member
- Mandatory 24 hr recovery **B**

Re-assess after 24 hrs

First concussion within the past 12 months

Second concussion within the past 12 months

- Three or more concussions within the past 12 months:
- Provide symptom management
  - Provide guidance for rest **B** and follow-up **E**
  - Refer to higher level of care for recurrent concussion evaluation

Symptoms present? **C**

No

Exertional test **D**

Symptoms present? **C**

No

- Service member may return to pre-injury activity with follow-up guidance **E**
- Document and code encounter in EMR

- Review the Return to Activity Educational Brochure **A-2** with the service member
- Initiate Stage 1 - Rest **B** - 24 hrs

Re-assess: Any new symptoms? or Symptoms rated as > 1 (mild) on the NSI **F**?

Yes

- Remain in Stage 1 - Rest **B**
- Provide symptom management
- Provide follow-up guidance **E**
- Progress through Stages 2-5 following recommended criteria **G,H**
- Refer if needed **I**

Exertional test **D**

Any new symptoms? or Symptoms rated as > 1 (mild) on the NSI **F**?

No

- Service member may return to pre-injury activity with follow-up guidance **E**
- Document and code encounter in EMR

Yes

Exertional test **D**

- Provide symptom management
- Provide follow-up guidance **E**
- Refer to rehabilitation provider for daily monitored progressive return to activity process **J**

Yes

Any new symptoms? or Symptoms rated as > 1 (mild) on the NSI **F**?

No

- Stage 6 - Unrestricted Activity.
- Service member may return to pre-injury activity with follow-up guidance **E**
  - Document and code encounter in EMR

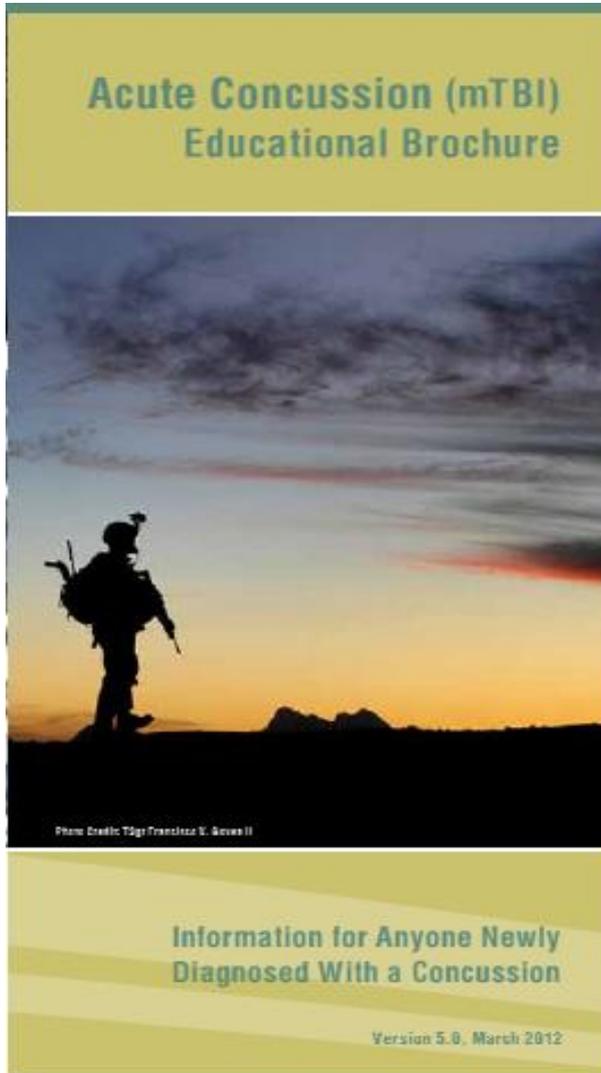
# First Steps

- We know from the literature that patient education is the single most important intervention following a concussion
- The Acute Concussion (mTBI) Educational Brochure should be given to all service members diagnosed with concussion

## Rest:

### B. Recommended Parameters for Recovery and Stage 1: Rest

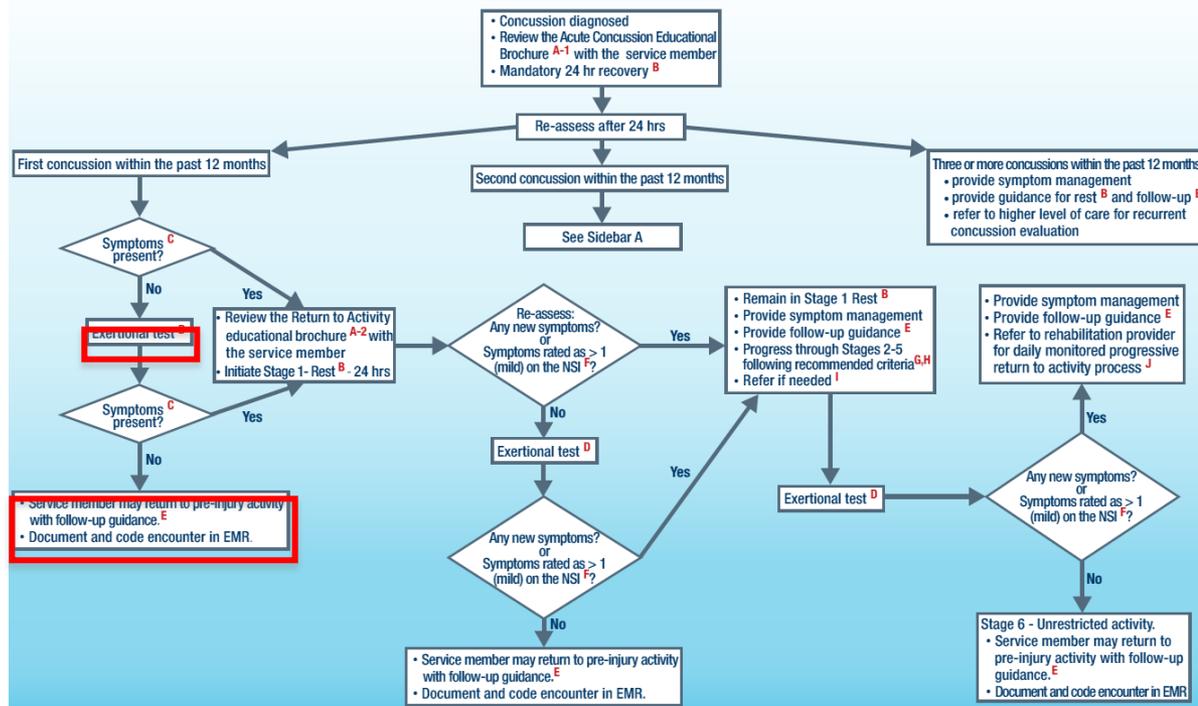
• Extremely light basic activities of daily living	• Avoid caffeine and tobacco
• Wear comfortable clothing	• No exercise
• Quiet environment with low lighting	• No alcohol
• Healthy sleep - naps as needed	• No video games
• Slow and limited range of motion	• No studying
• Walk on level surface at easy pace	• No driving



# First Concussion

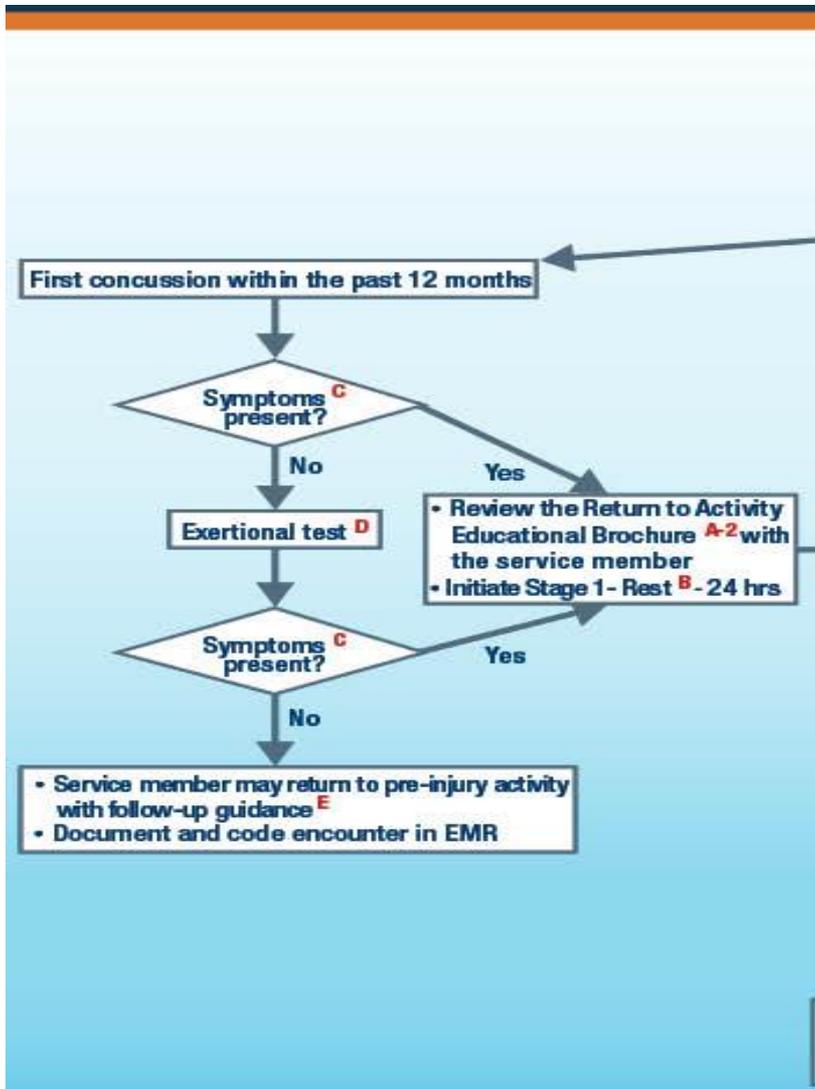
If the service member is asymptomatic after the 24-hour mandatory recovery, then exertional testing may be performed

- If the service member remains asymptomatic after exertional testing, the service member may return to pre-injury activity with follow-up guidance





# Entering into Progressive Activity Process



## References

**A-1.** Acute Concussion Educational Brochure - [dvbic.dcoe.mil](http://dvbic.dcoe.mil)

**A-2.** Return to Activity Educational Brochure - [dvbic.dcoe.mil](http://dvbic.dcoe.mil)

## B. Recommended Parameters for Recovery and Stage 1: Rest

• Extreme night basel activities of daily living	• Avoid caffeine and tobacco
• Wear comfortable clothing	• No exercise
• Quiet environment with low lighting	• No alcohol
• Healthy sleep - naps as needed	• No video games
• Slow and limited range of motion	• No studying
• Walk on even surface at easy pace	• No driving

## C. Symptoms

• Confusion (24 hrs)	• Irritability
• Unsteady on feet	• Vertigo/dizziness
• Headaches	• Photophobia
• Phonophobia	• Sleep issues

## D. Exertional Testing

• Exert to 65-85% of target heart rate (THR=220-age) using push-ups, sit-ups, running in place, step aerobics, stationary bike, treadmill and/or hand crank
• Maintain this level of exertion for approximately two minutes
• Assess for symptoms (headache, vertigo, photophobia, balance, dizziness, nausea, visual changes, etc.)
• If symptoms/red flags exist with exertional testing, stop testing, and consult with provider

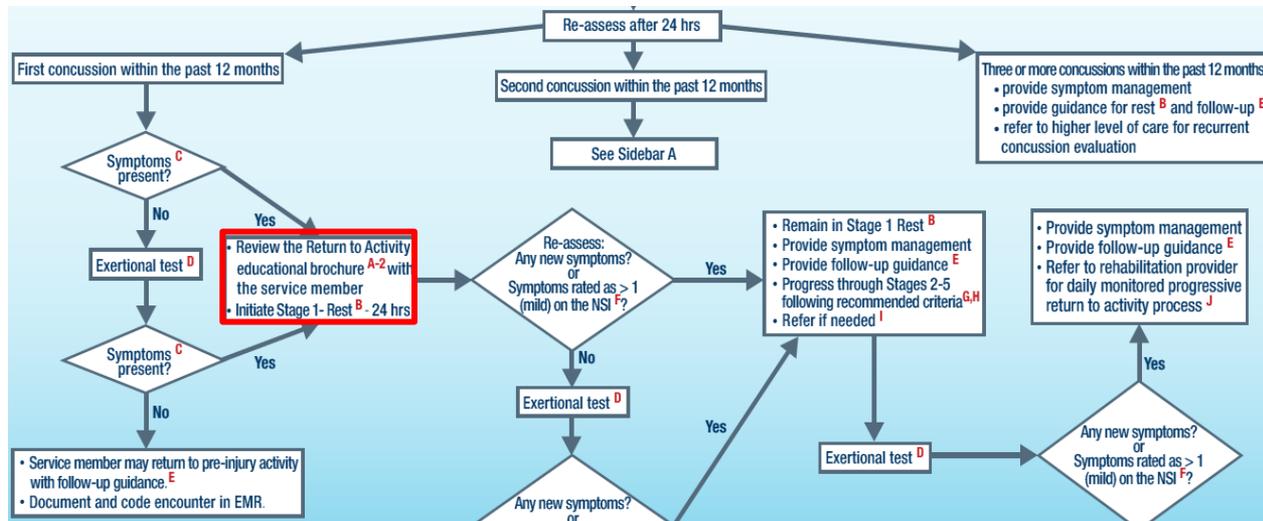
## E. Follow-up Guidance

Instruct patient to follow up with provider if:

- symptoms return
- symptoms increase in number and/or severity
- not able to progress for two consecutive days for first concussion

# First Concussion

- Initiate progressive activity process:
  - If the service member reports symptoms greater than 1 (mild) after the mandatory 24 hour recovery period
  - If the service member reports symptoms greater than 1 (mild) after exertional testing
- Provide a detailed review of allowable activities for each stage using the Return to Activity Educational Brochure



# Return to Activity Educational Brochure

## □ Stage 2: Light Routine Activity - All activities no longer than 30 minutes

You may wear a uniform and boots.

- Walk and stretch
- May ride a stationary bike at a slow pace with low resistance
- Do light housework
- Use the computer
- Play simple games, such as cards

### DO NOT!!!

- drink alcohol
- drive
- play video games
- do resistance training or repetitive lifting
- do sit-ups, push-ups or pull-ups
- go to crowded areas where you may be bumped into

## □ Stage 3: Light Occupation-oriented Activity

May perform these activities no longer than 60 minutes

- Lift and carry objects less than 20 pounds
- Take a brisk walk
- Ride in car and look around.
- Use an elliptical machine or stair climber
- Perform light military tasks such as cleaning equipment

May perform these activities no longer than 30 minutes

- Shop for one item at the store
- Talk to someone as you walk
- Gently increase your exposure to light and noise
- Perform a maintenance check on a vehicle

### DO NOT!!!

- drink alcohol
- drive
- play video games
- do resistance training or repetitive lifting
- go to crowded places
- participate in combatives or contact sports

## □ Stage 4: Moderate Activity

You may wear PPE.

May perform these activities no longer than 90 minutes

- Take a brisk walk
- Do light resistance training
- Participate in non-contact sports
- Perform moderate job-related tasks
- Climb, crawl or jog

May perform these activities no longer than 40 minutes

- Play video games, foosball, putting and ping pong
- Play strategy games such as chess or sudoku
- Shop for groceries
- Perform target practice
- Drive in a simulator

### DO NOT!!!

- drink alcohol
- participate in combatives or contact sports
- drive

## □ Stage 5: Intensive Activity

- Resume normal routine and exercise
- Participate in normal military, training and social activities
- Use night vision goggles, take part in simulations, or be exposed to bright light

- Start driving again
- Do heavy job-related tasks, such as digging
- Communicate by signals during patrol duty or use radio communication

### DO NOT!!!

- drink alcohol
- participate in combatives or contact sports
- go outside the wire in a combat zone

See your primary care manager in the morning after completing this stage to complete exertional testing.

## □ Stage 6: Unrestricted Activity

- Return to pre-injury activities

**Patients should discuss this brochure with their provider to ensure they understand the recovery process.**

## Return to Activity Educational Brochure

Guidance for Service Members With Symptoms Following a Concussion



### WHAT IS A CONCUSSION?

A concussion is a head injury from a hit, blow or jolt to the head that:

- briefly knocks you out (loss of consciousness), or
- may affect your ability to remember information before, during or after the event (post-traumatic amnesia), or
- makes you feel dazed, like you had your bell rung (alteration of consciousness)

A concussion is also known as mild traumatic brain injury (mTBI).

This brochure will help you to recover as quickly and safely as possible. Each stage is designed to help you gradually return to your normal routine, while your brain heals. You may have to stay at one stage longer than another if your symptoms do not go away or return when you try to do more activities. Everyone is different. Do not rush your progress.

# Return to Activity Educational Brochure

## WHAT SHOULD I EXPECT?

- Most people fully recover from concussions
- Immediately or soon after the injury, you may have the symptoms noted on the table on the following page
- Symptoms after a concussion can affect your performance, placing the safety of you or your unit at risk
- These temporary symptoms resolve faster when your brain gets rest, so it is important for you to take time to gradually recover
- Recovery is different for each person, but symptoms typically improve within hours, and resolve completely within days to weeks

## Red Flags: When Should I Seek Help?

If you experience any of the following contact your primary care manager immediately:

- passing out or blackouts
- weakness or numbness of any part of the body
- one pupil larger or smaller than the other
- slurred speech or difficulty speaking
- changes in hearing, taste or vision
- difficulty recognizing people
- not knowing where you are
- worsening headache
- unsteady on feet
- seizures
- vomiting
- unusual behavior
- double vision
- something just isn't right

### AVOID

- caffeine (it interferes with sleep)
- tobacco products
- sleeping aids or drugs, unless recommended to you by your health care provider

## RATE YOUR SYMPTOMS:

Each morning, rate your symptoms based on the table on the following page from 0-4.

- 0 = Rarely or never present. (None)
- 1 = Occasionally present but doesn't disrupt my activities. (Mild)
- 2 = Often present and occasionally disrupts my activities. I feel somewhat concerned. (Moderate)
- 3 = More frequently present and disrupts my activities. I can only do fairly easy, simple things. I feel I need help. (Severe)
- 4 = Almost always present. I can't perform at work, school or home because of it and I need help. (Very Severe)

## HOW DO I FEEL TODAY?

### RATE ON A SCALE OF 0-4

	0	1	2	3	4
Feeling dizzy					
Loss of balance					
Poor coordination, clumsy					
Headaches					
Nausea					
Vision problems, blurring, trouble seeing					
Sensitivity to light					
Hearing difficulty					
Sensitivity to noise					
Numbness or tingling on parts of my body					
Change in taste and/or smell					
Loss of appetite or increased appetite					
Poor concentration, can't pay attention, easily distracted					
Forgetfulness, can't remember things					
Difficulty making decisions					
Slowed thinking, difficulty getting organized, can't finish things					
Fatigue, loss of energy, getting tired easily					
Difficulty falling or staying asleep					
Feeling anxious or tense					
Feeling depressed or sad					
Irritability, easily annoyed					
Poor frustration tolerance, feeling easily overwhelmed by things					

Based on Neurobehavioral Symptom Inventory (NSI)

## DAILY GUIDANCE

- Complete the table on the previous page every morning. If you rate your symptoms as None or Mild (0-1), then move on to the next stage.
- If any symptoms get worse or you develop new ones, **immediately stop** what you are doing and rest for the remainder of that day.
- If your symptoms go away or are rated as mild (0-1) the next morning, you may carefully try the activities that you were doing the day before. Make certain that you follow the guidelines closely and do a little less of the activity that caused your symptoms to worsen.
- But if your symptoms are rated at 2 or higher on the NSI the next morning, go back to the last stage where you had no symptoms. Stay at that stage and contact your Primary Care Manager for further instructions.

## WHAT SHOULD I DO?

### After Mandatory 24 Hours of Recovery:

#### ☐ Stage 1: Rest

- Rest or do very light activity for another 24 hours. Only do basic things like eating, using the bathroom, resting and sleeping.
- Keep your head above your heart (when you put on your shoes, bring your foot to your knee)
  - Sit down when dressing and showering if needed
  - Walk on level surfaces at an easy pace
  - Limit head movements that cause symptoms
  - Stay in a quiet environment with low lighting
  - Periods of television with rest breaks each hour
  - Sleep as needed
  - Dress comfortably

### DO NOT!!!

- work or study
  - drink alcohol
  - exercise
  - drive
  - hold your breath or grunt\*
  - exert yourself to the point of making your heart race
  - play video games
- \*Pay attention to whether you are holding your breath when you bend over or are under stress.

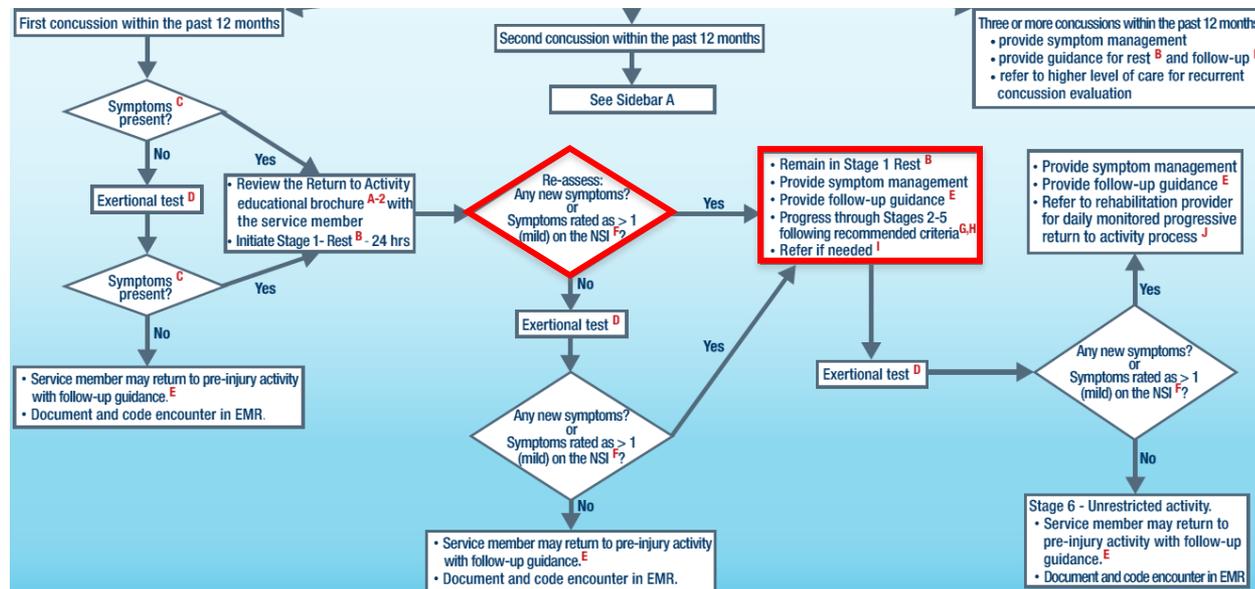
After this stage, see your primary care manager to discuss symptoms and determine next steps.

🏠 Practice good sleep habits (get 6-8 hours)  
See Healthy Sleep fact sheet at [dvbic.dcoe.mil](http://dvbic.dcoe.mil).

🚫 If your heart starts to race, immediately STOP what you are doing and rest.

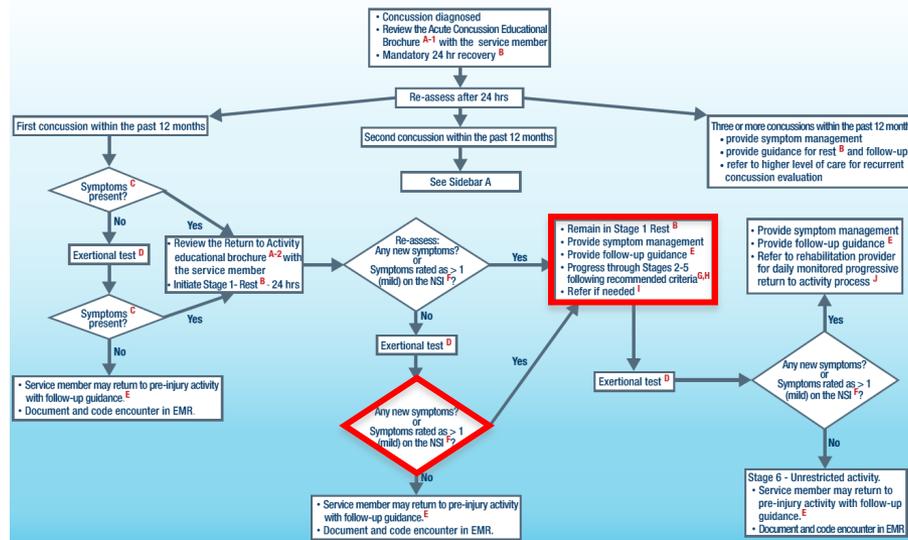
# First Concussion

- Service member to see PCM after Stage 1: Rest:
  - If symptoms are rated as 0 to 1 (mild), then the service member may undergo exertional testing
  - If the service member has new symptoms or symptoms rated >1 (mild), then the service member to remain at Stage 1 another 24 hours



# First Concussion

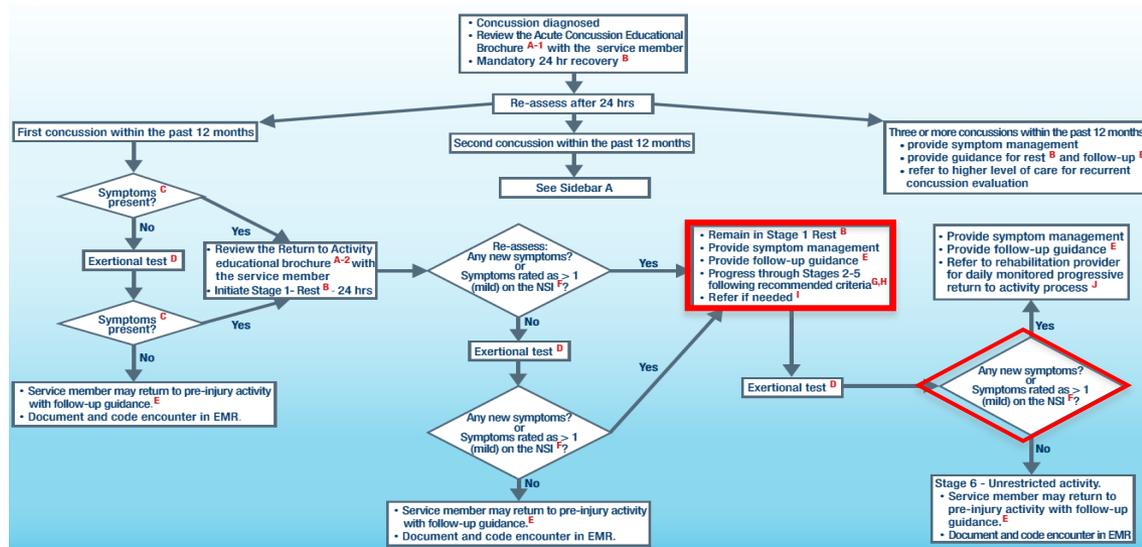
- Continue progressive activity process:
  - Service member completes the NSI daily after spending at least 24 hours in a given stage
- Progress to next stage:
  - If the service member has been in current stage for at least 24 hours
  - If the service member has no new symptoms
  - If daily NSI symptoms are reported as 0 to 1 (mild)



# First Concussion

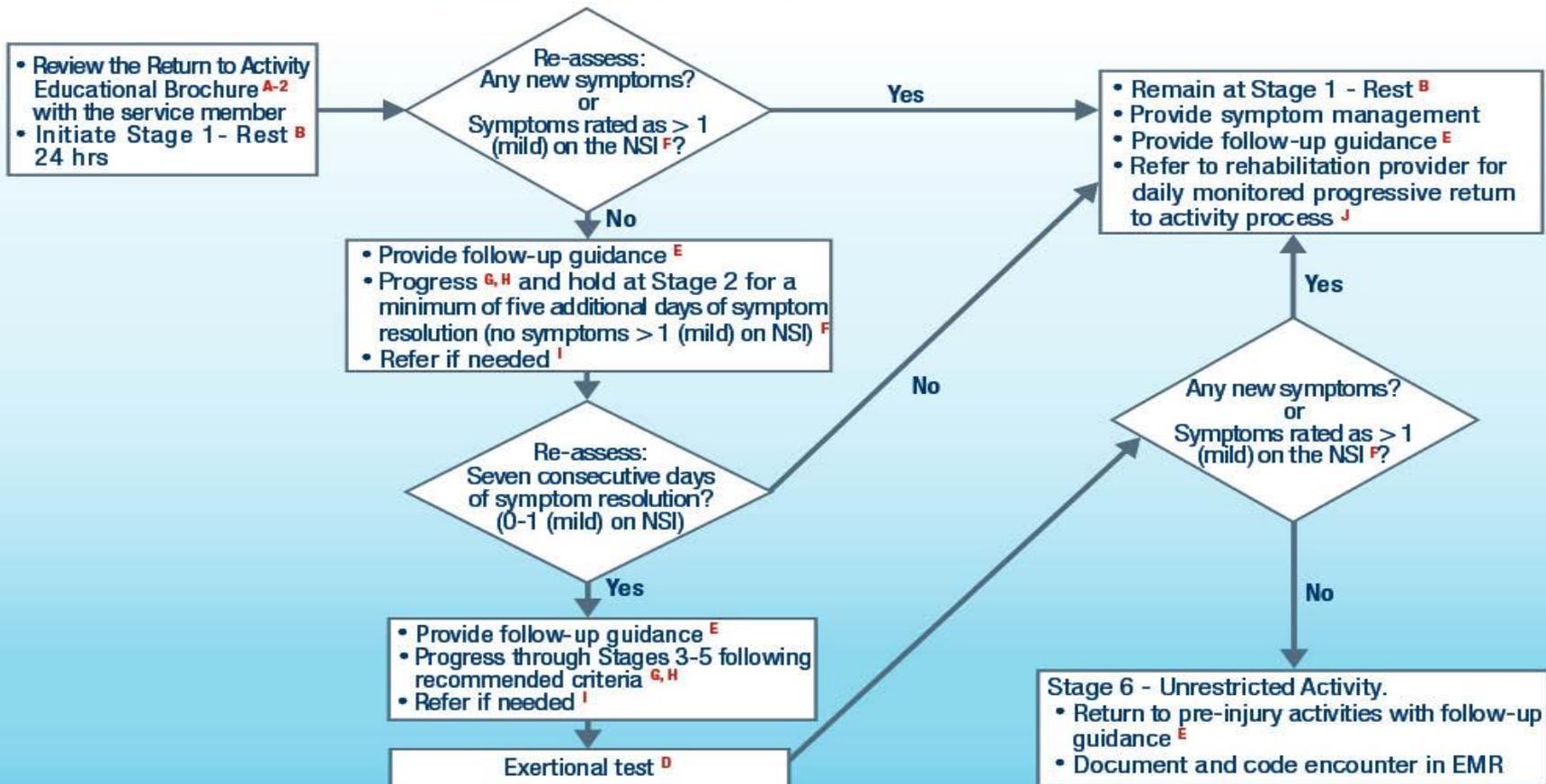
Refer to the RP for daily monitored progressive return to activity process:

- If recovery is not progressing as anticipated
- If there is no progression in seven days
- If symptoms are worsening
- If service member reports symptoms following exertional testing after Stage 5: Intensive Activity



# Second Concussion

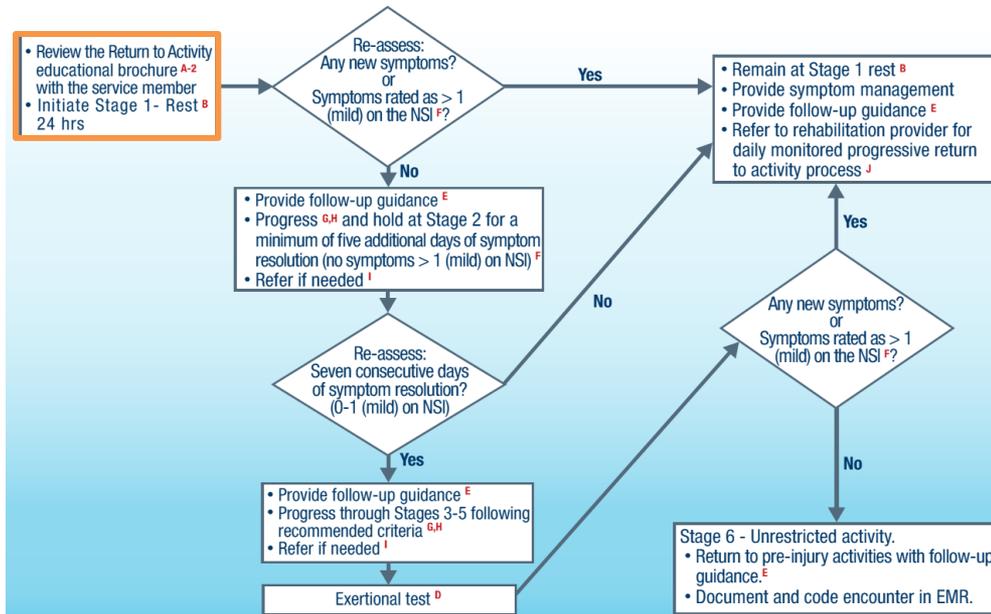
## Sidebar A - Progressive Return to Activity Following Acute Concussion/Mild TBI Second concussion within the past 12 months



# Second Concussion

- Initiate progressive activity process after the mandatory 24-hour recovery period
- Begin at Stage 1: Rest and provide a detailed review of allowable and avoidable activities for each stage using the Return to Activity Educational Brochure

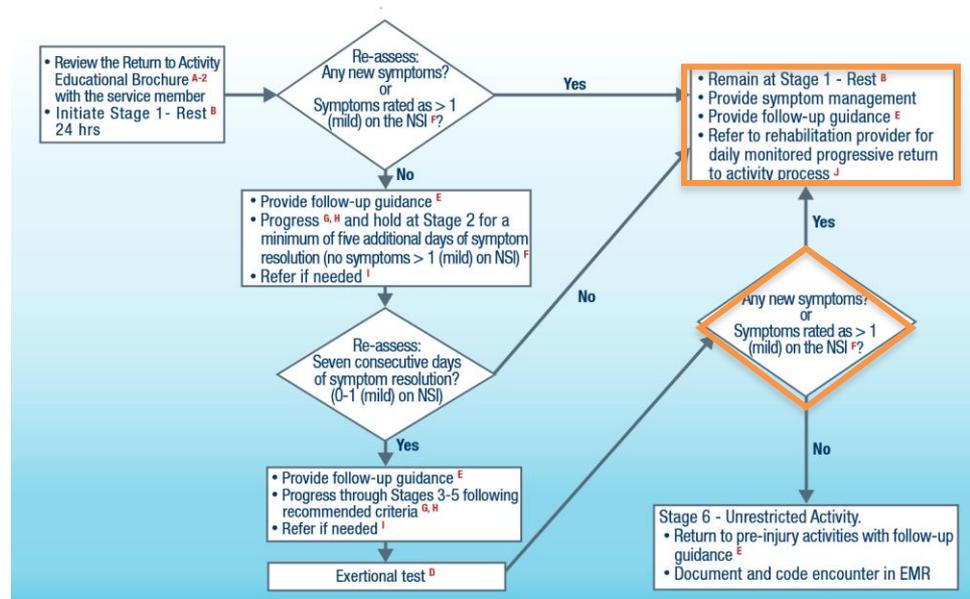
Second concussion within the past 12 months



# Second Concussion

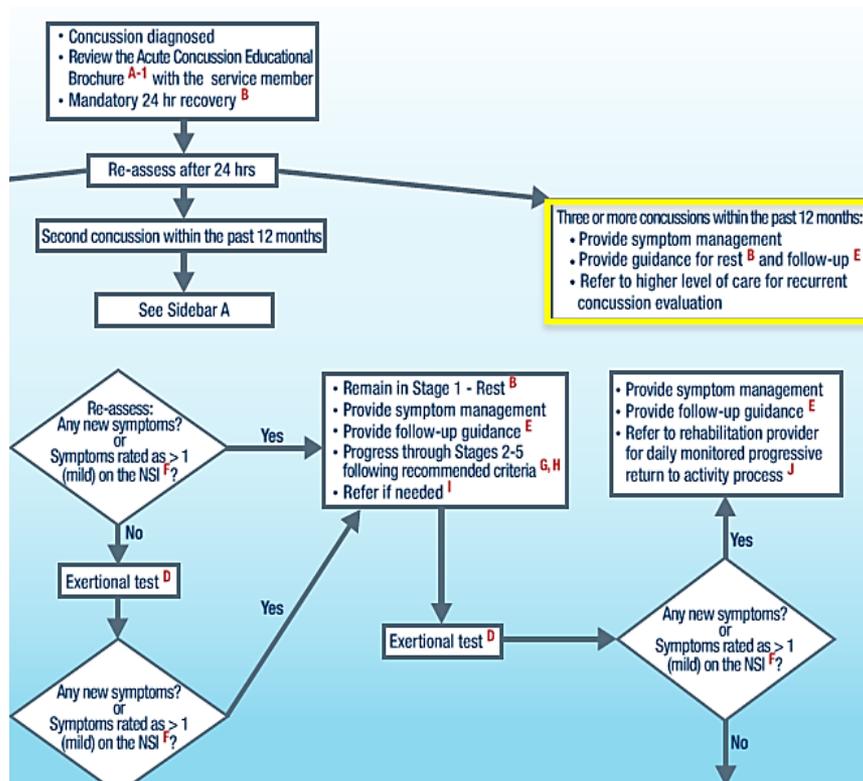
Refer to the RP for the daily monitored return to activity process:

- If recovery is not progressing as anticipated
- If there is no progression in seven days
- If symptoms are worsening
- If the service member reports symptoms following exertional testing after Stage 5: Intensive Activity



# Third Concussion

- Provide symptom management
- Provide guidance for rest and follow-up
- Refer to higher level of care for recurrent concussion evaluation



# Progression Through Activity

Following conditions apply at all stages and should be met for the service member to progress:

1. Each stage lasts a minimum of 24 hours and specifies activities permitted
2. The NSI is completed daily every morning
3. Service member may move to the next stage only if symptoms are reported as not greater than 1 (mild) and there are no new symptoms on NSI
4. If the service member reports an increase in the number or severity of symptoms during or after an activity:
  - The current activity must be **stopped** and the service member remains at the previously tolerated completed stage
  - Contacts their PCM for follow up

# Progression Through Activity

5. It is recommended that all service members see the PCM after Stage 5: Intensive Activity for exertional testing prior to resuming and before release to Stage 6: Unrestricted Activity
6. Refer the service member to a RP or higher level of care if:
  - Symptoms are worsening
  - Recovery is not progressing as anticipated
  - There is no progress for **seven days**
  - Service member is symptomatic after exertional testing following Stage 5: Intensive Activity, or per provider judgment

# RP Guidance

- The RP guidance is a continuation of the *Progressive Return to Activity Following Acute Concussion/mTBI: Guidance for the Primary Care Manager (PCM)*
- Distinction for patients between both recommendations include:
  - *Guidance for the Primary Care Manager* is a self-guided staged recovery
  - *Guidance for the Rehabilitation Provider* is a clinician-directed staged recovery

# Progression Across Stages

Use the following tools to assess both self-reported (subjective) and objective measures of progression across each stage:

- Self-reported Measures:
  - Neurobehavioral Symptom Inventory (NSI)
  - Borg Rating of Perceived Exertion (RPE) Scale
  
- Objective Measures:
  - Theoretical Maximum Heart Rate (TMHR) during activity
  - Resting Heart Rate (HR)
  - Resting Blood Pressure (BP)

# Objective Measures of Progression

- Borg Rating of Perceived Exertion Scale
  - Measures the intensity of physical activity based upon the physical responses that a person experiences during exercise
  - Reported on scale of 6 'no exertion at all' to 20 'maximum exertion'
- Theoretical Maximum Heart Rate
  - Calculated using:  $220 - age = TMHR$
- Resting BP (max 140/90 mmHg)
- Resting HR (max 100 beats per min)

Borg Rating of Perceived Exertion (RPE) Scale

<b>6</b>	No exertion at all
<b>7 - 8</b>	Extremely light
<b>9</b>	<b>Very light</b> exercise. For a healthy person, it is like walking slowly at his or her own pace for some minutes.
<b>10 - 12</b>	Light
<b>13</b>	<b>Somewhat hard</b> exercise, but it still feels OK to continue.
<b>14 - 16</b>	<b>Hard</b> (heavy)
<b>17 - 18</b>	<b>Very hard.</b> A healthy person can still go on, but he or she really has to push him- or herself. It feels very heavy, and the person is very tired.
<b>19</b>	<b>Extremely strenuous</b> exercise level. For most people this is the most strenuous exercise they have ever experienced.
<b>20</b>	<b>Maximal exertion</b>

Centers for Disease Control and Prevention, [cdc.gov](http://cdc.gov)

# Progression through Activity

- The following criteria apply at all stages and should be met for the service member to progress:
  - No new symptoms
  - No symptoms above rating of 1 (mild) on NSI
  - Resting BP not to exceed **140/90 mm Hg**
  - Resting HR not to exceed **100 bpm**
- Activity to rest intervals must be followed as defined
  - Example: *Stage 3: Light Occupational-oriented Activity - maximum of 60 minute physical activity periods followed by four hours of rest (1:4 ratio)*

# Progression Through Activity

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- If criteria for progression are met, advance to next stage
- If criteria for progression are not met, return to prior stage for **24 hours**
- If the service member reports symptoms during activity, stop activity and rest

# Progressive Return to Activity

- The progressive return to activity protocol measures three domains as parameters for ongoing evaluation:
  - Physical Progression
    - Includes activities from extremely light physical exertion to resistance training with maximum exertion tolerated (e.g., heavy military job tasks)
  - Cognitive Progression
    - Includes activity with very low cognitive demand (e.g., leisure reading) to activities that require multitasking or complex problem solving
  - Vestibular and Balance Progression
    - Includes activities with slow and limited range of head and body movement to activities that involve dynamic balancing and challenge greater vestibular needs (e.g., swimming with flip turns)



EXERCISE



ACTIVITY



SWIMMING

# Stage 1: Rest

## Objective

- Extremely light physical, cognitive and vestibular-balance activity with the goal of symptom resolution



## Activity and rest guidelines

- Primarily rest with extremely limited cognitive activity
- Basic activities of daily living and extremely light leisure activity
- Extremely light vestibular-balance activity is permitted, including walking on level surfaces and limited head movements
- **No work, exercise, video games, studying or driving**

Service member may return to pre-injury activity with follow-up guidance if NO symptoms are present (following exertional testing) after Stage 1

# Stage 2: Light Routine Activity

## Objective

- Initiate and promote limited effort
- Activity limited to 30 minute intervals or less followed by four hours of rest

## Activities

- Outdoor or indoor light physical activities, such as stretching, walking, stationary cycling at low pace and resistance
- Cognitive activities such as computer use, leisure reading and simple board games
- Vestibular *and* balance activities such as climbing stairs, putting on boots and bending tasks
- **NO video games, driving, resistance training, repetitive lifting, sit-ups, push-ups or pull-ups**



# Stage 3: Light Occupation-oriented Activity

## Objective

- Increase intensity and complexity of exercise and cognitive activity



## Activities (in addition to previous stage)

- Lift and carry objects less than 20 lbs., use elliptical or stair climber machines or light military tasks such as cleaning equipment
- Cognitive activities such as increasing exposure to light and noise, performing a maintenance check on vehicle or shop for one item
- Balance activities including walking on uneven terrain, swimming (avoiding flip turns) or standing on one foot
- Physical activities not to exceed 60 minutes followed by minimum four hours rest; light cognitive activities not to exceed 30 minutes followed by minimum 60 minutes rest
- **NO video games, driving, combatives or collision sports**



# Stage 4: Moderate Activity

## Objective

- Increase in intensity and complexity of exercise and cognitive activity to match demands of occupation

## Activities (in addition to previous stage)

- Physical activities such as brisk hiking, jogging to running as tolerated, light resistance training or non-contact sports
- Cognitive activity with greater demand such as video games, land navigation, driving simulator, weapons simulator or target practice
- Vestibular/balance activities with greater demand such as swimming with flip turns, jump rope
- Physical activities not to exceed 90 minutes followed by minimum six hours rest; cognitive activities not to exceed 40 minutes followed by minimum 80 minutes rest
- **NO driving, combatives or collision sports**



# Stage 5: Intensive Activity

## Objective

- Duration/intensity of activity parallels service member's typical role, function and tempo

## Activity (in addition to previous stage)

- Resume usual physical exercise routine
- Cognitive activities may include driving (as appropriate), weapons simulator or target practice
- Vestibular/balance activities may include running, patrol duty, jump landing, use of night vision goggles
- Physical activity duration is only limited if symptomatic; cognitive activities not to exceed 50 minutes followed by rest
- Include multitasking and problem solving
- **NO combatives or collision sports**



*\*Service member to see PCM after Stage 5 for exertional testing and before release to Stage 6: Unrestricted Activity*

# Stage 6: Unrestricted Activity

## Objective

- Resume pre-injury activities

## Follow-up guidance

- Return to provider if symptoms return



*DoD Photo, by Sgt. Jeffrey Alexander (3<sup>rd</sup> Brigade Combat Team)*

# Key Points

## First Concussion

- Service member may return to pre-injury activity level if:
  - Service member remains asymptomatic or reports symptoms as 0 to 1 (mild) on NSI after exertional testing
- Exertional testing may be performed:
  - If service member is asymptomatic after 24-hour mandatory recovery period
  - If service member has no new symptoms or has an NSI score of 0 to 1 (mild) following Stage 1: Rest
  - After successful completion of Stage 5: Intensive Activity

# Key Points

## Second Concussion

- Service member may return to pre-injury activity level if:
  - Service member has seven consecutive days of symptom resolution *and* remains asymptomatic or reports symptoms as 0 to 1 (mild) on NSI after exertional testing following Stage 5: Intensive Activity

# Key Points

- The progressive return to activity process is recommended for those concussed service members who remain symptomatic after the mandatory recovery period and an additional 24 hours in Stage 1: Rest **or** those who become symptomatic after exertional testing
- If symptoms reported on the NSI are above 1 (mild), or if there is an increase in the number of symptoms, then the service member should not be advanced, remain at their current stage, and follow-up the next day
- If the service member fails to progress for more than seven days they should be referred to the RP or concussion care specialist
- The service member does not need to do all of the activities on the handout to advance (the examples provided are for reference)

# Key Points

- The service member is recommended to stay at each stage for a minimum of one day
- Patients entering process are not recommended to skip stages (the brain requires time to recover from concussion)
- If symptoms reported on the NSI are above 1 (mild), or if there is an increase in the number of symptoms, then the patient should not be advanced to the next stage and should be returned to prior stage for 24 hours
- Appropriate rest between activities should also be considered
- NSI results for each stage should be entered in the permanent health record

# Polling Questions

- During Stage 1: Rest, of the progressive return to activity process, which of the following activities are permitted?
  - A. Treadmill walking at low speed
  - B. Shopping in the exchange for a single item
  - C. Video games
  - D. Television with rest break each hour
  
- Which of the following would prevent a service member with concussion from progressing to the next stage of the progressive return to activity process?
  - A. Symptoms greater than 1 (mild) on the Neurobehavioral Symptom Inventory
  - B. New symptom complaints
  - C. Spending less than 24 hours in any given stage
  - D. All of the above
  
- Is it permissible to skip a stage if the service member is asymptomatic?
  - A. Yes
  - B. No

# Conclusion



The role of these clinical recommendations is to provide the PCM and RP with guidance for progressive activity following concussion/mTBI and when it is recommended to refer

Progressive return to activity is recommended for those service members who remain symptomatic upon completion of the mandatory recovery period

Progression should be measured in three domains: physical, cognitive and vestibular/balance

Progression is dependent upon the number and intensity of symptoms, activity tolerance and provider assessment

Required measures of progression include: NSI (Neurobehavioral Symptom Inventory) no new symptoms 1 (mild), resting HR <100 bpm and resting BP <140/90 mm Hg

Increase demands systematically and progressively, observe changes; modify intensity/duration of activity based on symptoms

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# Questions?

- Submit questions via the Q&A box located on the screen.
- The Q&A box is monitored and questions will be forwarded to our presenter for response.
- We will respond to as many questions as time permits.



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# Save the Date

## Next DCoE Psychological Health Webinar

### Topic:

### *Mild TBI and Co-occurring Psychological Health Disorders*

March 27, 2014

1-2:30 p.m. (EDT)



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## Next DCoE TBI Webinar Topic:

### *Family Functioning and TBI*

April 10, 2014

1-2:30 p.m. (EDT)



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