

David W. Hebda, Ph.D.  
Clinical Neuropsychologist

**Overview of brain injury, common issues arising after brain injury, and how to make the most of a neuropsychological assessment for vocational planning.**

### Relevance to VR Workers

- The Silent Epidemic
- TBI Incidence: 100 hospitalized cases per 100,000 population
- Cerebral Palsy: 10 per 100,000
- Spinal cord: 4 per 100,000

### Incidence of Traumatic Brain Injury

- 500,000 to 3,000,000 per year in U.S.
- 400,000 to 500,000 result in hospitalization or death
- The rest don't.....

### Peak ages

- 15-24 (MOTOR VEHICLE CRASHES)
- 0-5 (falls)
- Over 64 (falls)

### Common myths regarding TBI

- The "Hollywood Myth" of brain injury
- The Recovery Myth
- The 20% Myth
- The reality: Your lap
- Even mild brain injuries can result in serious neurobehavioral consequences

### **Getting back into the work force makes a difference!**

- The life expectancy of most head-injured persons is, as best we know, similar to that of the average individual. For a severe head injury the lifetime costs are over \$3 million; for moderate injury, \$941,000; and for mild trauma \$85,000.

## A Brief Outline

- Part I: Tutorial on the brain and its functions, and various types of injuries and their effects
- Part II: “Translating” a brain injury into functional, vocational terms—The Neuropsychological Evaluation

### **Part I: Organization of Brain and its functions**

#### **Protective layers**

- Pia Mater
- Dura Mater
- Arachnoid

...not designed to be injured  
...no pain cells in brain itself

#### Meningeal Layers

##### Three views of brain functions

- Bottom to top (more basic to more complex activities)
- Left to right (our “two brains”)
- Back to front (the lobes of the brain)

#### Cross Section

##### Organization of brain—bottom to top

- Basic functions:
- Brain stem
- Reticular formation
- Medulla
- Cerebellum
- Limbic system
- Cortex: outer “bark” of the brain

### 1. Brain Stem: Life itself

#### Brain Structures

## 2. Limbic System

- Primitive structure, developmentally speaking
- Emotion
- Memory
- Below the cortex
- Regulated by the cortex
- Cortical injuries have a disinhibiting effect on emotions

### Diagram—Limbic System

Limbic Systems in rabbit, cat, monkey, human

#### “Regressive” effects of brain injuries

- Limbic structures are relatively well-protected in TBI
- Cortex is most susceptible, damaged by contusion, shear-strain injury
- Result is “disinhibition”—emotions “come out” and are perceived more intensely
- Intense emotions are more likely to affect behavior

## 3. The Cortex

- Outer “bark” of brain
- Responsible for receiving sensory information and acting on it
- Inhibits limbic structures

### Basic Cortical Functions: Left to Right

- Our two brains

### Human Brain

#### Diffuse injury:

- Usually a variety of symptoms, including physical, cognitive, and emotional
- Somatic symptoms: Headache, dizziness, nausea, blurred vision, drowsiness, increased experience of pain.

#### Diffuse Injury=Cognitive Deficits

- Amnesia for event
- Short-term memory loss

- Disorientation
- Confusion
- Cognitive slowing
- Short attention span
- Distractibility
- Fatigue

### Diffuse Injury-Emotional Deficits

- Agitation
- Irritability
- Apathy
- Depression
- Sleep disturbance
- Lability

### Diffuse Injury—Psychosocial Deficits

- Confrontational attitude
- Impatience
- Explosive temper
- Thoughtlessness
- Egocentrism
- Inability to take perspective

### Routinely screen for TBI

- Was there a history of head trauma?
- Was there loss of consciousness? How long?
- Were there any lingering problems (e.g., headache, problems concentrating, problems with new learning)
- Are there still problems?

### DSM-IV Cognitive Disorder NOS

- Postconcussional syndrome
  - History of head trauma
  - Evidence from NP testing to show problems with attention or memory
  - Three or more of the following occur shortly after the trauma:
    - Fatigue, disordered sleep, headache, vertigo or dizziness, irritability or aggression, anxiety, depression, affective lability, personality changes

- (inappropriateness), apathy
- Symptoms have onset after trauma
  - Disturbance causes significant impairment
  - Symptoms do not meet criteria for dementia

The six most important things VR counselors need to know from a neuropsychological evaluation

### **1. Pre-injury history:**

Are there premorbid issues, such as ADHD, Learning Disabilities, Mental Health issues? Insist on comprehensive social and medical histories, including medication regime

### **2. Level of intellectual functioning**

- Insist on obtaining the FSIQ score
- This is the single best predictor of the LEVEL of occupational placement

IQ related to academic potential of adults

- Below 70 Low elementary school
- 70-79 -- Intermediate school
- 80-89 -- Some high school
- 90-109 -- High school, community college
- 110-119 -- College
- Over 120 -- Graduate school

### **3. Hemispheric differences**

- Left hemisphere vs. right hemisphere deficits
- This gives information on the TYPE OF JOB TASKS in which the individual is most likely to find success: Verbal vs. Non-verbal (i.e., visual motor), as well as expectations of BEHAVIOR and level of management needed at work.

WAIS-III—The most researched, the most useful

1. Verbal IQ (more left hemisphere; comprised of six subtests)
2. Performance IQ (more right hemisphere; five subtests)
3. Full Scale IQ (average of the two, but may not be most predictive measure if hemispheric differences)

#### 4. Memory skills, i.e., ability for new learning?

This has implications for one's ability to learn new job tasks, how much extra training will be needed, and whether a structured, set routine is necessary (e.g., individuals with anoxic injuries).

MAS Standard Scores (same statistical properties as IQ)

Score	Description	% of Population
• 130+	Very superior	2.2%
• 120-129	Superior	6.7%
• 110-119	High average	16.1%
• <b>90-109</b>	<b>Average</b>	<b>50%</b>
• 80-89	Low average	16.1%
• 70-79	Borderline	6.7%
• Below 70	Extremely low	2.2%

#### 5. Mental health / behavioral issues

- Are there behavioral and or emotional problems which may interfere with ability to return to work?
- Single most disqualifying factor!
- Ask for specific, multi-axial DSM-IV diagnoses

#### 6. Treatment Recommendations: Insist on them!

- What problems are treatable?
  - Medication?
  - Therapy?
- What problems require the use of compensatory strategies? What are they?
- What problems require the use of accommodations in the work place? What are they?

##### Treatable Problems

- Attention (neurostimulants, SSRIs, SNRIs)
- Speed (possible neurostimulants; review benzodiazepines or antiseizure meds)
- Mood (depression, anxiety, irritability)
- Behavior (antidepressants, mood stabilizers)
- Memory (anticholinesterase inhibitors: Aricept, Exelon, etc.)

- Medication and therapy (1<sup>st</sup> six months)

### Compensatory Strategies

- Day planners
- Alarm watches
- Written instructions
- Tape recorders

### Accommodations

- Attention: Repetition
- Speed: Extra time
- Memory: Multiple modes