Concussions In Athletes

“Contemporary Management”

Paul S. Saenz D.O.
Sportsmedicine Associates
Of San Antonio

TOMA/TxACOFP 2012
San Antonio, Tx.
Describing Head Injury
“Texas Style”

- He really got his “bell rung” !!!
- Man, he got his “clock cleaned” !!!
- He acted like he got kicked in the head by a mule !!!
- The lights were on but nobody was home !
Sports Illustrated

CONCUSSIONS

SPECIAL REPORT

THE HITS THAT ARE CHANGING THE GAME...

By PETER KING

...AND THE HITS NO ONE IS NOTICING

By DAVID EPSTEIN
Under the Microscope

- Tremendous media attention
- Legislative review and action
- Increase in litigious cases involving coaches, ATC’s and doctors
- Sports bodies under pressure to ensure appropriate surveillance
Sports Related Head Injury

- 1.6-3.8 M (CDC 2008)
- 135,000 ER visits
- Highest in 5-18 y/o
- 40-80% HS annually
- Teens take longer to recover
- Four-fold increase of reoccurrence
“Aim was to provide recommendations for the improvement of safety and health of athletes who suffer concussions”
Sports Concussion

Definition: A complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces.
Pathomechanics

- Linear or rotational forces: acceleration / deceleration of the brain → transient alteration of brain function → physical, cognitive, behavioral changes
Neuropathophysiology

- Microscopic / Chemical changes:
  - cell membrane stability
  - ion channels
  - glucose metabolism
  - neuron depolarization
  - free radical production
Common Features of Sport Concussion

- “Impulsive” force to brain caused by direct blow to head, face, neck or elsewhere

- Rapid onset of short lived neurologic impairment – resolves spontaneously

- Symptoms represent more a functional disturbance than structural injury, +/- LOC

- Normal imaging studies
Common Signs

- dazed, stunned appearance
- confusion: assignment/position
- moves clumsily
- answers questions slowly
- mood, behavior, personality changes
- amnesia
Common Symptoms

- Headache, pressure in head
- Nausea, vomiting
- Dizziness, balance problems
- Blurred vision, photosensitivity
- Difficulty concentrating
- Feels “down”, groggy, foggy
Sideline Evaluation of Head Injury

- Review of symptoms
- Assess level of orientation
- Head and neck exam
- Detailed neurologic exam
- Assess memory and cognitive function
- Athlete with S/S of concussion is removed from contest
What questions to ask?

- H/A, dizziness, nausea, blurred vision?
- What stadium or gym?
- Last opponent?
- Days of week in reverse order?
- 3 word recall: cat, ball, umbrella?
Universal Guidelines

- Remove every concussed athlete from play
- On-field and repeated sideline evaluations
- Transport any deteriorating athlete
- Treat every LOC as concomitant cervical injury
In April, the NCAA Executive Committee adopted the following policy for institutions across all three divisions.

- Institutions shall have a concussion management plan on file such that a student-athlete who exhibits signs, symptoms or behaviors consistent with a concussion shall be removed from practice or competition and evaluated by an athletics healthcare provider with experience in the evaluation and management of concussion.
- Student-athletes diagnosed with a concussion shall not return to activity for the remainder of that day.
- Medical clearance shall be determined by the team physician or their designee according to the concussion management plan.
- In addition, student-athletes must sign a statement in which they accept the responsibility for reporting their injuries and illnesses to the institutional medical staff, including signs and symptoms of concussions. During the review and signing process student-athletes should be presented with educational material on concussions.
Medical Management

• Managed by a physician with expertise

• Physical and Cognitive rest

• Ancillary testing as indicated

• Graduated RTP protocol*
Graduated Return to Play Protocol

- Step-wise process
- Each step = 24 hours
- Progress to next step if asymptomatic for at least 24 hours at that level
- If symptomatic, rest for 24 hours, then drop athlete down to previous step and try to progress again
Graduated RTP Protocol

- No activity
- Light aerobic exercise
- Sport specific exercise
- Non-contact training drills
- Full contact practice
- RTP
So what else is going on?
Neuropsychological Testing

- Method to assess information relating to neurological deficits suffered post-concussion when compared to baseline neurological function

- **Adjunct** to clinical decision making process

- Expense and time factor limits widespread use

Examples:

- Immediate Post Concussion Assessment and Cognitive Testing-ImPACT
- Balance Error Scoring System-BESS
- AxonSports/CogsSport
ImPACT Testing: (Immediate Post-concussion Assessment and Cognitive Testing)

- Computerized neurocognitive test used to assist in RTP decisions
- 20 min. online test best measured against baseline 48-72h post concussion
- Measures memory (verbal, visual), attention, reaction times, processing speed
<p>| | | | |</p>
<table>
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<td><strong>Organization:</strong></td>
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<td><strong>Age:</strong></td>
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<td><strong>Date of Birth:</strong></td>
<td>11/07/1989</td>
<td><strong>Height:</strong></td>
<td>76 inches</td>
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<tr>
<td><strong>Gender:</strong></td>
<td>Male</td>
<td><strong>Weight:</strong></td>
<td>210 lbs</td>
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<td>Right</td>
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<td>United States</td>
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<td></td>
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<td><strong>Years Speaking:</strong></td>
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<td><strong>Years of education completed:</strong></td>
<td>14</td>
<td><strong>Repeated one or more years of school:</strong></td>
<td>No</td>
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<tr>
<td><strong>Received speech therapy:</strong></td>
<td>No</td>
<td><strong>Diagnosed learning disability:</strong></td>
<td>No</td>
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<td><strong>Attended special education classes:</strong></td>
<td>No</td>
<td><strong>Problems with ADD/hyperactivity:</strong></td>
<td>No</td>
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<td><strong>Current sport:</strong></td>
<td>Football</td>
<td><strong>Current level of participation:</strong></td>
<td>Collegiate</td>
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<td><strong>Primary position:</strong></td>
<td>Sophomore</td>
<td><strong>Years experience at this level:</strong></td>
<td>1</td>
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<td></td>
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<tr>
<td><strong>Number of times diagnosed with a concussion (excluding current injury):</strong></td>
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<td></td>
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<tr>
<td><strong>Concussions that resulted in loss of consciousness:</strong></td>
<td>0</td>
<td></td>
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<tr>
<td><strong>Concussions that resulted in confusion:</strong></td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td><strong>Concussions that resulted in difficulty remembering events that occurred immediately after injury:</strong></td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td><strong>Concussions that resulted in difficulty remembering events that occurred:</strong></td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td><strong>Total games missed as a result of all concussions combined:</strong></td>
<td>0</td>
<td></td>
<td></td>
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<td><strong>Concussion history:</strong></td>
<td>September/2006 September/2010</td>
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<td></td>
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<tr>
<td></td>
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<tr>
<td><strong>Treatment for headaches:</strong></td>
<td>No</td>
<td><strong>History of meningitis:</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Treatment for migraine:</strong></td>
<td>No</td>
<td><strong>Treatment for substance/alcohol abuse:</strong></td>
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<td><strong>Treatment for epilepsy/seizures:</strong></td>
<td>No</td>
<td><strong>Treatment for psychiatric condition</strong></td>
<td>(depression, anxiety):</td>
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<tr>
<td><strong>Treatment brain surgery:</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diagnosed with ADD/ADHD:</strong></td>
<td>No</td>
<td><strong>Diagnosed with Autism:</strong></td>
<td></td>
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<tr>
<td><strong>Diagnosed with Dyslexia:</strong></td>
<td></td>
<td><strong>Strenuous exercise in the last 3 hours:</strong></td>
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### ImPACT™ Clinical Report

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Baseline</th>
<th>Post-Injury 1</th>
<th>Post-Injury 2</th>
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</thead>
<tbody>
<tr>
<td>Date Tested</td>
<td>09/7/2010</td>
<td>09/20/2010</td>
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<tr>
<td>Last Concussion</td>
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<td>Exam Language</td>
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### Composite Scores

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<th>Score Type</th>
<th>Baseline</th>
<th>Post-Injury 1</th>
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<tr>
<td>Memory composite (verbal)</td>
<td>100</td>
<td>99</td>
<td>99</td>
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<tr>
<td>Memory composite (visual)</td>
<td>71</td>
<td>70</td>
<td>70</td>
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<tr>
<td>Visual motor speed composite</td>
<td>46.83</td>
<td>41.5</td>
<td>46.9</td>
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<tr>
<td>Reaction time composite</td>
<td>0.56</td>
<td>0.61</td>
<td>0.56</td>
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<tr>
<td>Impulse control composite</td>
<td>2</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Total Symptom Score</td>
<td>0</td>
<td>1</td>
<td>0</td>
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**Cognitive Efficiency Index:**

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<tr>
<th>Baseline</th>
<th>Post-Injury 1</th>
<th>Post-Injury 2</th>
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<tbody>
<tr>
<td>0.48</td>
<td>0.52</td>
<td>0.54</td>
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</table>

The Cognitive efficiency Index measures the interaction between accuracy (percentage correct) and speed (reaction time) in seconds on the Symbol Match test. This score was not developed to make return to play decisions but can be helpful in determining the extent to which the athlete tried to work very fast on symbol match (decreasing accuracy) or attempted to improve their accuracy by taking a more deliberate and slow approach (jeopardizing speed). The range of scores is from approximately zero to approximately 1.70 with a mean of 0.34. A higher score indicates that the athlete did well in both the speed and memory domains on the symbol match test. A low score (below 0.20) means that they performed poorly on both the speed and accuracy component. If this score is in **bold RED** type exceed the Reliable Change Index (RCI) when compared to the baseline score. However, scores that do not exceed to RCI index may still be clinically significant. Percentile scores if available are listed in small type.

**Hours slept last night**

|             | 7 | 7.5 | 7 |

**Medication**

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The information provided by this report should be viewed as only one source of information regarding an individual's level of [neurocognitive] functioning. Even though impact is based on demonstrated scientific principles and research, external factors such as improper test administration or improper test taking environment may result in inaccurate test results. These factors and others must be considered in making return-to-play decisions. The information provided by this report is of a general nature and does not represent medical advice, a diagnosis, or prescription for treatment. Additionally, diagnostic or return to play decisions should not be based solely on the data generated by this report, but on an in-person evaluation made by a professional trained in concussion management in accordance with usual and standard medical practice. An individual suspected of suffering traumatic brain injury or concussion should immediately seek the advice of qualified and trained personnel for interpretation of test results and should be monitored closely for the emergence of symptoms. Impact is not responsible for any decisions based on information contained in the report. A test-taker’s qualified and trained personnel has the sole responsibility for establishing diagnosis and suggesting appropriate treatment.
## ImPACT™ Clinical Report

### Word Memory

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<tbody>
<tr>
<td>Hits (Immediate)</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Correct distractors (immed.)</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Learning percent correct</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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<tr>
<td>Hits (delay)</td>
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<td>11</td>
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<tr>
<td>Correct distractors (delay)</td>
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<td>12</td>
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<tr>
<td>Delayed memory pct. correct</td>
<td>100%</td>
<td>96%</td>
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<td>Total percent correct</td>
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<td>98%</td>
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### Design Memory

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<tr>
<td>Hits (Immediate)</td>
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<td>9</td>
<td>11</td>
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<tr>
<td>Correct distractors (immed.)</td>
<td>12</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Learning percent correct</td>
<td>92%</td>
<td>79%</td>
<td>96%</td>
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<td>Hits (delay)</td>
<td>12</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Correct distractors (delay)</td>
<td>10</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Delayed memory pct. correct</td>
<td>92%</td>
<td>67%</td>
<td>83%</td>
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<tr>
<td>Total percent correct</td>
<td>92%</td>
<td>73%</td>
<td>89.5%</td>
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### X's and O's

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<th>8</th>
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<tr>
<td>Total correct (memory)</td>
<td>125</td>
<td>116</td>
<td>128</td>
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<tr>
<td>Avg. correct RT (interference)</td>
<td>0.44</td>
<td>0.46</td>
<td>0.42</td>
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<tr>
<td>Total incorrect (interference)</td>
<td>2</td>
<td>7</td>
<td>2</td>
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<tr>
<td>Avg. incorrect RT (interfer.)</td>
<td>0.43</td>
<td>0.41</td>
<td>0.3</td>
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### Symbol Match

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<tr>
<td>Total correct (visible)</td>
<td>1.55</td>
<td>1.45</td>
<td>1.37</td>
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<tr>
<td>Avg. correct RT (visible)</td>
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<tr>
<td>Total correct (hidden)</td>
<td>1.24</td>
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<td>1.3</td>
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<tr>
<td>Avg. correct RT (hidden)</td>
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### Color Match

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<td>Total correct</td>
<td>0.73</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Avg. correct RT</td>
<td>0</td>
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<tr>
<td>Total commissions</td>
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<tr>
<td>Avg. commissions RT</td>
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## ImPACT™ Clinical Report

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<tbody>
<tr>
<td>Total sequence correct</td>
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<tr>
<td>Total letters correct</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Pct. of total letters correct</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Avg. time to first click</td>
<td>1.73</td>
<td>1.99</td>
<td>1.72</td>
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<tr>
<td>Avg. counted</td>
<td>21.4</td>
<td>18.8</td>
<td>21.4</td>
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<tr>
<td>Avg. counted correctly</td>
<td>20.8</td>
<td>18</td>
<td>20.6</td>
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<tr>
<td>Nausea</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
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<td></td>
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<tr>
<td>Balance Problems</td>
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<td></td>
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<tr>
<td>Dizziness</td>
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<td></td>
<td></td>
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<tr>
<td>Fatigue</td>
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<td></td>
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<tr>
<td>Trouble falling asleep</td>
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<td></td>
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<tr>
<td>Sleeping more than usual</td>
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<tr>
<td>Sleeping less than usual</td>
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<tr>
<td>Drowsiness</td>
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<tr>
<td>Sensitivity to light</td>
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<tr>
<td>Sensitivity to noise</td>
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<tr>
<td>Irritability</td>
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<td></td>
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<tr>
<td>Sadness</td>
<td></td>
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<tr>
<td>Nervousness</td>
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<td></td>
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<tr>
<td>Feeling more emotional</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Numbness or tingling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling slowed down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling mentally foggy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Symptom Score</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
ImPACT™ Clinical Report

Memory Composite (Verbal)

Memory Composite (Visual)

Visual Motor Composite

Reaction Time Composite

Impulse Control Composite

Symptom Score

Page 5

09/22/2010
Vestibular Testing

- Relates concussion to vestibular dysfunction
- Assessment by cognitive and vestibular tests
- Permits active treatment: steroids, diuretics, vestibular exercises
Chronic Traumatic Encephalopathy

- Neurodegenerative disease caused by repeated concussions producing neurologic impairment

- CTE may result in:
  - memory loss
  - behavioral abnormalities
  - speech impairment
  - depression

- Center for Study of TE at Boston (McGee):
  - identified Tau protein in brains of football players and wrestlers
Bennet Omalu M.D.

- Pathologist, researcher: Brain Injury Research Institute West Virginia U.
- Chronic Traumatic Encephalopathy: 22 cases among NFL retirees
- Recommended 3 mo. post concussion recovery period for under 18 y/o
- Based on lab markers present 3 mo. post injury
Methods of Concussion Prevention

- No proven method to date
- Research focused on etiologic environmental factors
- Research on helmet and mouthpiece design
Future Directions

- Greater utilization of assessment tools
- Better understanding of age, gender effects
- Rehab strategies- balance exercises, meds
- Biomarkers: ApoE4 gene, Amyloid Precursor Protein, tau polymerase, S100B
- Functional imaging studies
- Virtual reality tools
- Equipment design
Texas House Bill 2038

What does it mean for me ???
House Bill 2038

What does it mean for me ???
HB 2038:

- Amendment to Education Code Ch.38
- Subchapter D: Prevention, Treatment and Oversight of Concussion affecting Student Athletes
- Became law May 24th, 2011, 82nd Legislature
- Applies to 2011-2012 school year
HB 2038: Applicability

- Interscholastic athletic activities
- School districts, public, home or charter schools
- Formation of Concussion Oversight Team
HB 2038: Concussion Oversight Team*

- Physician
- Athletic Trainer
- Advanced Practice Nurse
- Physicians Assistant
- Neuropsychologist

* Must attain training in concussion recognition and management
HB 2038: Responsibilities

- Student athlete and parent must sign concussion acknowledgement form

- Removal from play by:
  - physician
  - ATC
  - coach
  - parent
  - LHCP
HB 2038: Coaches Training

• UIL approved training course
  - 2 hour minimum
  - submit proof of completion
  - completed by Sept. 12th. 2012

• Similar requirements for ATCs and LHCPs
HB 2038: Return to Play

- Evaluation by *physician* and written RTP form
- Student completes RTP protocol
- Parent signs form consenting to RTP and delivers to designated compliance officer
- Parent acknowledges risks, immunity, disclosure

* a coach may not authorize RTP
Summary:

- Incidence of sports concussions under intense scrutiny
- State legislatures mandating changes
- Physicians treating athletes must attain training
- Neurocognitive testing – mainstream
- Research focusing on biomarkers and long term sequelae
Thank You !!!!!!!!!!!
HB 2038: UIL Responsibilities

- Monitor compliance of schools and districts
- Provide standardized forms
- Provide resources and learning opportunities (UIL website)
  - www.nfhslearn.com
  - http://www.tea.state.tx
Coaches Responsibilities

- Remove athlete from play and harms way
- Ensure appropriate medical evaluation by HCP
- Inform parents and provide fact sheet
- Await clearance before RTP
UIL Concussion Management Program

- Palm cards in Football Coaches Manual (Brain Injury of America)
  - instruction on sideline evaluation
  - grading system *
  - management recommendations
  - RTP guidelines *
Heads Up: Concussion in High School Sports

- CDC program
  - online training
  - fact sheets
  - symptom posters
  - wallet cards

- Four Step Action Plan
Educational Resources

- UIL
  - www.uil.utexas.edu

- NCAA
  - www.ncaa.org/health/safety

- Center for Disease Control and Prevention
  - www.cdc.gov

- Sports Concussions
  - www.sportsconcussions.org
**Signs and Symptoms**

<table>
<thead>
<tr>
<th>Confusion</th>
<th>LOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amnesia</td>
<td>Poor balance</td>
</tr>
<tr>
<td>Headache</td>
<td>Seizure</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Poor concentration</td>
</tr>
<tr>
<td>Vertigo</td>
<td>Vacant stare</td>
</tr>
<tr>
<td>Nausea</td>
<td>Vomiting</td>
</tr>
<tr>
<td>Visual changes</td>
<td>Slurred speech</td>
</tr>
<tr>
<td>Tinnitus</td>
<td>Decreased performance</td>
</tr>
<tr>
<td>Irritability</td>
<td>Emotional changes</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Slow responses</td>
</tr>
</tbody>
</table>
Severe Head Injury

- Cerebral contusion
- Intracranial hemorrhage
- Epidural hematoma
- Subdural hematoma
- Intracerebral hematoma
- Diffuse axonal injury
2nd. International Conference on Concussion in Sport, Prague 2004

- 1st ICCS, Vienna 2001: IIHF, FIFA, IOC

- Provide recommendations for safety and health of athletes who suffer concussions

- 2nd ICCS included a panel of experts; “Concussion in Sport Group”

- Result: new classification scheme, assessment methods (SCAT), management strategies and RTP criteria
3rd. International Conference on Concussion in Sport, Zurich 2008

- A “Consensus Statement” and revision and update of 1st, 2nd ICCS
- Intended for DO’s/MD’s, ATC’s, therapists, coaches and health professionals
- Abandoned “Simple” vs. “Complex” classification
- Renewed attention to LOC, amnesia, special populations, injury prevention and future directions
- SCAT2
Neuro-Pathophysiology of Concussion

- Cerebral Metabolic Dysfunction
  - Increase in glucose demand
  - Reduction in cerebral blood flow
  - Injury induced “state of vulnerability”
The Concussive Penumbra

- Similar to ischemic stroke
- Increased tissue susceptibility
- Various factors alter clinical process
- P/M exertion, sleep, dehydration
Initial Evaluation of Head Injury

- Assess level of consciousness: motion, verbalizations, response to stimuli
- ABC’s of evaluation:
  A – airway
  B – breathing
  C – circulation
- Determine need for cervical immobilization and transport to neurosurgical facility
Sports Concussion Assessment Tool (SCAT 2)

- Standardized assessment of athletic concussion
  - symptom evaluation
  - cognitive/physical
  - balance/coordination

- Best compared to pre-season baselines
Neuropsychological Testing

- Cognitive function important in RTP decision
- Attention, concentration, memory, coordination, motor function
- NP baselines of clinical value
- Internal/external variables effect reliability
Future Directions

• Significance of LOC and Amnesia
• Effects of age and gender
• Rehabilitation strategies
• On-field injury severity predictors
• Rule changes
AOSSM “Concussion In Sports” Workshop (1997)

- American Association of Neurological Surgeons
- American Academy of Orthopedic Surgeons
- American Academy of Neurology
- American Osteopathic Academy of Sportsmedicine
- American Medical Society for Sportsmedicine
- American Academy of Pediatrics
- NFL, NHL, NCAA, NATA
Concussion Workshop

- Reviewed scientific literature of brain injury
- Focused on evaluation and classification
- Reviewed current assessment tools
- Recommended return to play criteria
Concussion Management Protocol (UIL)

- Management of Concussion in Sports “palm card”
- Mandated for use with ALL athletes
- Included within Football Coaches Manual
- Doctors, coaches, trainers all speaking the same language
Minor Head Injury

American Academy of Neurology:

- Grade I:
  - transient confusion
  - no LOC
  - symptoms resolve < 15 min.
Minor Head Injury

- Grade II:
  - transient confusion
  - no LOC
  - symptoms > 15 min.
Minor Head Injury

- Grade III: any loss of consciousness
Standardized Assessment of Concussion (SAC)

- Developed to establish a valid, standardized, systematic, immediate sideline assessment of concussion
- Includes measures of orientation, immediate memory, concentration and delayed recall
Standardized Assessment of Concussion (SAC)

- Administered by athletic trainers and other medical personnel
- Post-concussion score compared to pre-obtained baseline score
Return to Play Criteria

- Grade I: RTP same day
- Multiple Grade I: RTP only after asymptomatic for one week
Return to Play Criteria

- Grade II:
  - RTP only after asymptomatic for one week
- Multiple Grade II:
  - RTP only after asymptomatic for two weeks
Return to Play Criteria

- **Grade III**
  - (Brief LOC): asymptomatic for one week
  - (Prolonged LOC): asymptomatic for two weeks

- **Multiple Grade III:**
  - asymptomatic for one month; longer at physician’s discretion
Second Impact Syndrome

- Second concussion occurs prior to recovery from previous concussion
- Acute brain swelling, brain stem herniation, death
- Cerebral autoregulatory dysfunction
- Second blow may be minor
New Classification of Concussion in Sport

- **Simple Concussion:**
  - most common, S/S resolve in 7-10 days
  - rest while symptomatic
  - graded exertional program then RTP

- **Complex Concussion:**
  - athlete suffers persistent symptoms
  - prolonged LOC (>1 min.)
  - repeated concussions
  - advanced testing and management
Thank You !!!
1999 NBA CHAMPION
SAN ANTONIO SPURS
Neuropsychological Instruments

- Trailmaking test: parts A and B
- Stroop test, Wechsler Memory Scale
- Hopkins verbal learning test
- Standardized Assessment of Concussion
Medical Management

- **Simple Concussion:**
  - physical and cognitive rest
  - light aerobic exercise; no weights
  - sport specific exercise; PRE
  - non-contact drills
  - full contact
  - RTP
Medical management

- **Complex Concussion:**
  - managed by physician with expertise
  - physical and cognitive rest
  - consider neuropsychological testing
  - consider neuroimaging
  - vestibular (balance) testing
- RTP protocol as per simple concussion
Head Injury and Concussion in Athletes

“What do we really know in 2010” ???

Paul S. Saenz D.O.
Sportsmedicine Associates of San Antonio
Head Injury and Concussion in Athletes

“The Two Minute Drill”

Paul S. Saenz D.O.
Sportsmedicine Associates
of San Antonio
Definition (Consensus Statement on Concussion in Sport: 3rd International Conference on Concussion in Sport, Zurich, November 2008)

• Caused by direct blow to head, face, neck, or elsewhere on the body with an “impulsive” force to the head

• Results in rapid onset of short-lived neurological impairment that resolves spontaneously

• May result in neuropathological changes, but acute clinical symptoms reflect functional disturbance rather than structural injury

• Results in graded set of symptoms that may or may not involve loss of consciousness. Resolution of symptoms typically follows sequential course

• No abnormality is seen on standard neuroimaging
So what do I need to know????
Head-injury cases in kids are on the rise

High School Softball Adds Concussion Rule

Simple test may spot concussion in athletes

Parents Ill-Informed About Kids' Concussion Risks

Concussions among female athletes on the rise
Severe vs. Minor Head Injury

- Severe – associated with structural damage to brain; potentially may result in death or long term disability

- Minor (concussion) – a trauma induced alteration of mental status with or without loss of consciousness
Classification of Concussion

According to the Zurich Conference in 2008:

- Concussion grading scales should no longer be used

- Terms “simple” and “complex” no longer used

- Concussion now considered as a single entity that can be affected by various modifying factors
Athletic Trainers Responsibilities

- Remove athlete from play and harms way
- Ensure appropriate *medical* evaluation
- Inform parents and provide fact sheet
- Await clearance before RTP
Purdue Study

- Journal of Neurotrauma, Oct 2010
- Head injury monitored by HIT Test, ImPact and fMRI
- Evidence for brain injury without S/S
- Cumulative blows to anterior frontal cortex
Helmet Design
Mouth Guards