Concussion
(mild Traumatic Brain Injury)

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Quiz Question 1

- 34 year old female, after a work injury.
- Lost consciousness for 2 min.
- 7 months later complains of headaches, memory and concentration problems, difficulty with word findings, fatigue, etc.

Quiz Question 1

- What is the least likely diagnosis:
  - Concussion
  - Depression
  - Somatization
  - PTSD
  - Malingering
  - Normal findings

Quiz Question 2

- 26 year old male, in an MVA.
- PTA for 30 min.
- 2 months later not improving.

Quiz Question 2

- What is the least likely diagnosis:
  - Concussion
  - Depression
  - Somatization
  - PTSD
  - Malingering
  - Normal findings

Quiz Question 2

- What is the % of people not recovering from mTBI:
  - 0%
  - 5%
  - 15%
  - 50%
  - 100%

Historical Background

Historical Background

- Washington's throat swelled so painfully that he could not swallow.
- On Washington's fateful day, Albin Rawlins, one of his bloodletter, was summoned. Washington bared his arm.
- The bloodletter had brought his lancet and made an incision. Washington said, "Don't be afraid."
- That day, Rawlins drew 12 ounces of blood, then 18 ounces, another 18 ounces and a final 32 ounces into a porcelain bleeding bowl.

Historical Background

- Dr. Benjamin Rush, a renowned physician and surgeon general of the Continental Army, was defending himself against allegations of malpractice because of excessive bloodletting.
- He sued a journalist who accused him of killing patients.
- Dr. Rush won his case.
- Bloodletting continued as a regular practice until the mid – 19th century.

Traumatic Cancer

- 1884: Germany first introduced the WCB system.
- 2,000 new books and papers on “traumatic cancer” were published in Germany alone.

Railway Spine

- in 1866: Erichsen, a British physician, introduced the term.
- Jarring of the spine back and forth.
- 40 years later rejected.
- Symptoms were best explained by “neurosis”.

Repetitive Strain Injury
The Australian Epidemics

- 1983, Australia.
- Rumors spread that outmoded keyboards were sold on the Australian market.
- Keyboard operators developed intractable, chronic pain in the neck and arm and significant disability.
- In some sectors of the public service 30% of workers were affected.

Repetitive Strain Injury
The Australian Epidemics

- Physicians prescribed numerous treatments incl. surgeries.
- In mid 1980's when the penny dropped, the epidemic was quickly terminated.
- Most sufferers are now back at work, doing the same job and using the same equipment as before.

Thermography

- Widely used by chiropractors to make the diagnosis of nerve impingement, disc injury, facet joint pain, myofascial pain.

- Asymmetrical thermograms are common in normal population with no back complaints.

  Mahoney, 1985

Whiplash and Eye

- In 1955, research described 12 ways in which whiplash affects the eyes.

Gnight 1959

  - "Notable loss of convergence" is the cause of symptoms.
  - "Most of the patients respond rapidly to simple convergence training".

Whiplash and Eye

- Much later, control groups were included in the studies.
- Ordinary healthy people had an equal share of such abnormalities.
- Articles of eye damage by whiplash disappeared from literature.

Whiplash and Diziness

- Whiplash causes dizziness by creating scarring in neck muscles, which compress the subclavian artery.
- Cut neck muscles and dissect the subclavian artery.
- 92% of patients were cured.
- Disappeared from medical literature.

Whiplash and Ear

- ENT specialists came up with a device called electronystagmograph (ENG).
- ENG found nystagmus in about half of all whiplash victims.
- Later was found out that half of the population has same ENG findings.

Whiplash and Ear

- Moving platform posturography found fistulas in the vestibule, as potential cause of dizziness in whiplash patients.

  Grimm, 1989

- Found fistulas in 167 / 389 patients whiplash.
- Treated with 6 weeks of strict bed rest. If no improvements: surgery.
- Good to excellent outcome is achieved in 70% of patients.

John Shea 1992
ENT surgeon from Memphis

- “During the course of 39 years of surgical practice and more than 36,000 operations I have never seen of such fistula”.
- “I believe that the modern interest in …. fistula began in the minds of a small group of true believers”.
- “This myth has become so accepted that one is in danger of being sued for not exploring for fistula…”.

2010s Nova Scotia

- 4 family physicians went for 1 week in US.
- Came back as “Concussion specialist”.

2010s Nova Scotia

- Concussion damage the eyes.
- Concussion damage ear.
- Occolo-vestibular concussion was coined.
- Prism therapy cures the damage.

Rate of Concussion WCB of Nova Scotia

Concussion & intracranial injuries

Year	# of injuries
2011	143
2012	156
2013	171
2014	193

Concussions became an injury category on annual reports in 2011. Prior to this it lump into another section.

2010s Nova Scotia

Same ending ????

Objectives

- Diagnosis
- Symptoms/Complaints
- Prognosis
- Treatment
- Case study

Definition

- Traumatic Brain Injury (TBI):
  - Mild
  - Moderate
  - Severe

- “Concussion” means “mild TBI”

Definition

American Congress of Rehabilitation Medicine, Key 1993

- Loss of consciousness of < 30 min
- Post traumatic amnesia < 24 hours
- Glasgow Coma Scale of 13 - 15, 30 min post injury
- Alteration in mental status “dazed” or “stunned”

Definition

More recently, the notion has been introduced that "*stunning*" represents concussion.

This state has found its way into various guidelines.

There is no reason to presume that it shares the same mechanism as concussion.

Victor and Adams Principles of Neurology, 8th Edition

Definition

- Concussion can occur without direct trauma to the head (e.g. acceleration/deceleration movements).

American Congress of Rehabilitation Medicine, Key 1993

Evidence-based diagnosis of mild TBI

- Acceleration/deceleration without head contact cause concussion only in pilots crashing in military aircraft.
- Up to 300 Hg threshold needed. McLean, 1997
- Before this threshold is reached cervical fractures occur. Viano 2001

Evidence-based diagnosis of mild TBI

- Acute clinical signs and symptoms:
  - Recognizable and verifiable acute symptoms.
  - Self - reported symptoms after acute phase are not useful.

– A remembered head blow strongly suggests that no concussion occurred.

Prognosis

McCrea MA, Mild Traumatic Brain Injury and Postconcussion Syndrome, Oxford University Press, 2008

- 14,251 college football, soccer, lacrosse, and hockey players.
- More than 80% of subjects reported full symptom recovery in less than 1 week.
- Only 3% reported symptoms beyond 1 month post injury.

McCrea et al. Acute Effects and Recovery Time Following Concussion in Collegiate Football Players: The NCAA Concussion Study, JAMA, 2003

- 1,631 college football players and uninjured controls.
- Cognitive function return to normal in 5 to 7 days.
- Balance testing return to normal in 3 to 5 days.
- No lingering cognitive symptoms or balance by 90 days.
- Only 10% required more than 1 week to recover.

Advantages of Studying in Athletes

- Large sample of people at risk of mTBI
- Obtain pre-injury baseline testing
- Witnessed accounts
- Can conduct standardized testing < min of the injury
- Systematic follow up
- Continuity of care (usually the same practitioner)
- Access to non-injured controls
- “Clean sample” (athletes are usually not influenced by motivation factors, litigation, or malingering) .

World Health Organization Collaborating Center Task Force on Mild Traumatic Brain Injury, 2004

- Review of 428 articles on prognosis after concussion.
- Prognosis is highly favorable.
- The majority recovered within 3 to 12 months.
- Where the symptoms persisted, compensation was a factor.

Prognosis

- Reviews of the literature: neuropsychological function return to baseline by weeks to months:
  - Carroll et al., 120 studies
  - Dikmen et al., 2009, 33 studies, 6 meta-analyses representing 133 studies.
  - Belanger et al., 2005; 21 studies
  - Belanger & Vanderploeg, 2005, 8 studies
  - Binder et al., 1997; 17 studies
  - Frencham et al., 2005; 25 studies
  - Rohling et al., 2011; 39 studies

Concussion Resolves in 3 Months

- Rohling M.L. et al, A Meta Analysis of Neuropsychological Outcome After Mild Traumatic Brain Injury: Reanalysis and Reconsideration of Binder et al (1997) Frencham et al (2005) and Pertab et al (2009), The Clinical Neuropsychologist, 2011

- Rohling M.L, Larrabee G.J, Millis S.R., The “Miserable Minority” Following Mild Traumatic Brain Injury; Who are They and do Meta Analysis Hide Them?, Clinical Neuropsychologist 2012.

The American Medical Association, Guides to the Evaluation of Permanent Impairment, 6th Edition

- "….the symptoms of mild traumatic brain injury generally resolve in days to weeks, and leave the patient with no impairment"

- "Patients with persistent post cognitive symptoms generally have non-injury related factors which complicate their clinical course".

Evidence-based diagnosis of mild TBI

- If the course is deterioration rather than improvement, other factors could be at play.
- A concussion likely did not occur.

Miserable Minority

- Alexander in 1995
  - 15% of mTBI patients still have disabling symptoms at 1-year post injury.
- Alexander based his estimation of 2 references:
  - Rutherford et al. 1979.
  - McLean et al. 1983.

Miserable Minority

- Rutherford et al. 1979
  - Reported that 19 of 133 individuals mTBI still had symptoms 1-year post injury.
  - However, of these 19 patients
    - 8 were involved in lawsuits
    - 6 were suspected of malingering at 6-weeks post injury.

Miserable Minority

- Rutherford et al. 1979
  - 1-year post injury
    - 6 / 19 patients only had 1 symptom
    - 7 / 19 patients had 2 symptoms at
  - Lower than the rate of the normal healthy population.

Miserable Minority

- Rutherford et al. 1979
  - There were no control subjects.

Miserable Minority

- McLean et al. 1983
  - A mixture of mTBI, moderate and severe injuries.
  - There was no data collected beyond 1-month post injury.

Post - Concussion Syndrome

- Symptom attributed to concussion.
- A very controversial diagnosis.

Post-concussion syndrome

- Same symptoms are found in:
  - General population
  - Depression
  - Stress
  - Lack of sleep
  - Medications

Wang Y. Examination of Post-Concussion-like Symptoms in Healthy University Students: Relationships to Subjective and Objective Neuropsychological Function Performance, Arch Clin Neuropsychol, 2006

- 124 healthy university students.
- 45% endorsed at least 5 post - concussion symptoms:
  - Fatigue 77%
  - Taking longer 60%
  - Poor concentration 59%
  - Sleep disturbance 50%
  - Frustration 46%

Iverson and Lange, Examination of "Postconcussion-like" symptoms in a healthy sample. Appl Neuropsychol. 2003

- Healthy volunteers from a Vancouver university.
- 79.6 % of healthy people without a history of head injury satisfied the diagnostic criteria for PCS.
- Post-concussion symptoms are not unique to concussion.
- They are common in healthy individuals.

Iverson in 2006 Iverson G. L. Misdiagnosis of the Persistent Post-Concussion Syndrome in Patients with Depression, Arch Clin Neuropsychol, 2006

- 9/10 individuals with depression met the criteria for PCS.

Lees-Haley and Brown, Archives of Clinical Neuropsycholog, 1993

- 170 individuals in litigation for sex, race, verbal harassment at work, wrongful termination, etc.
- No head injuries or physical injuries.
- 50 controls from a family practice seen for sore throat and respiratory complaints were given the same questionnaire.

Lees-Haley and Brown, Archives of Clinical Neuropsycholog, 1993

- Symptoms attributed to PCS was very common in controls (general population).
- However, individuals involved in litigation reported much higher rates of symptoms of PCS (although none of them had suffered any head or physical injury).

Rate of Post Concussion Symptoms

- Headache 88%
- Concentration difficulties 78%
- Memory problems 53%
- Feeling disorganized 61%
- Loss of efficiency in daily tasks 56%
- Confusion 59%
- Chronic fatigue 79%
- Impatience 65%
- Word finding problems 34%
- Trouble reading 24%
- Speech problems 18%
- Visual problems 32%
- Dizziness 44%
- Hearing problems 29%
- Tremor 30%
- Nausea 38%
- Anxiety or nervousness 93%
- Depression 89%
- Irritability 77%
- Sleeping problems 92%
- 2 x more neck, back and shoulder pain than controls.

Lees-Haley and Brown, Archives of Clinical Neuropsycholog, 1993

- Going through litigation and the "upsetting event" was the cause of the symptoms, not brain injury.

McCrea MA, Mild Traumatic Brain Injury and Postconcussion Syndrome, Oxford University Press, 2008

Table 16.1 Frequency of Common PCS Symptoms in Non-MTBI Samples

	HEADACHE	DIZZINESS	IRRITABILITY	MEMORY PROBLEMS	CONCENTRATION PROBLEMS
College students[9]	36%	18%	36%	17%	42%
Chronic pain[10]	80%	67%	49%	33%	63%
Depressed[11]	37%	20%	52%	25%	54%
PI claimants (non-TBI)[12]	77%	41%	63%	46%	71%
MTBI[13]	42%	26%	28%	36%	25%

Berry, Arch Neurol. 2000

- A study of demolition derby drivers.
- Average 1900 collisions / per driver / per year.
- None had clinically significant headaches.
- Trauma does not cause prolonged headaches.

Haas 1996

- Post - traumatic headaches have no special features.
- 50% satisfied IHS criteria for chronic tension headache.
- 19% satisfied criteria for headache from analgesic abuse.
- 21% satisfied the criteria for migraine without aura.

Warner, 1996

- 85% of people who complained of headaches after a trauma, when removed from litigation, acknowledged that they had headaches before trauma.

Post - concussion syndrome

- Headaches are usually a result of:
  - Neck sprain
  - Occipital Neuralgia
- Dizziness can be a result of:
  - Labyrinth injury

Larrabee and Rohling, Behaviour Science Law. Neuropsychological differential diagnosis of mild traumatic brain injury, 2013

- Reviewed the meta-analysis of neuropsychological outcomes.
- Full recovery from an uncomplicated MTBI by 90 days post trauma.

Larrabee and Rohling, Behaviour Science Law. Neuropsychological differential diagnosis of mild traumatic brain injury, 2013

- Post - concussion symptoms: differential diagnosis
  - Somatoform presentation.
  - Symptom expectation: iatrogenic (physician - caused) disorder.
  - Malingering.

Diathesis - Stress Model

- Expectations.
- Misattribution of common/daily complaints to the brain injury.

Diathesis - Stress Model

- “An unfortunate scenario unfolds when a patient with vague symptom complaints and no clear indication of significant head trauma is told that he has ‘brain damage’ and will never make a complete neurological, symptom, or functional recovery”.

- “The long-term damage of creating that perception for a patient is most difficult to undue”.

Diathesis - Stress Model

- Numerous stimuli are constantly filtered in the brain.
- Only a small fraction reaches conscience attention.

  Pennebaker 1982, 1994, 1983, 1991
- After giving a diagnosis, the ambiguous sensations previously ignored are now interpreted as evidence a disease.

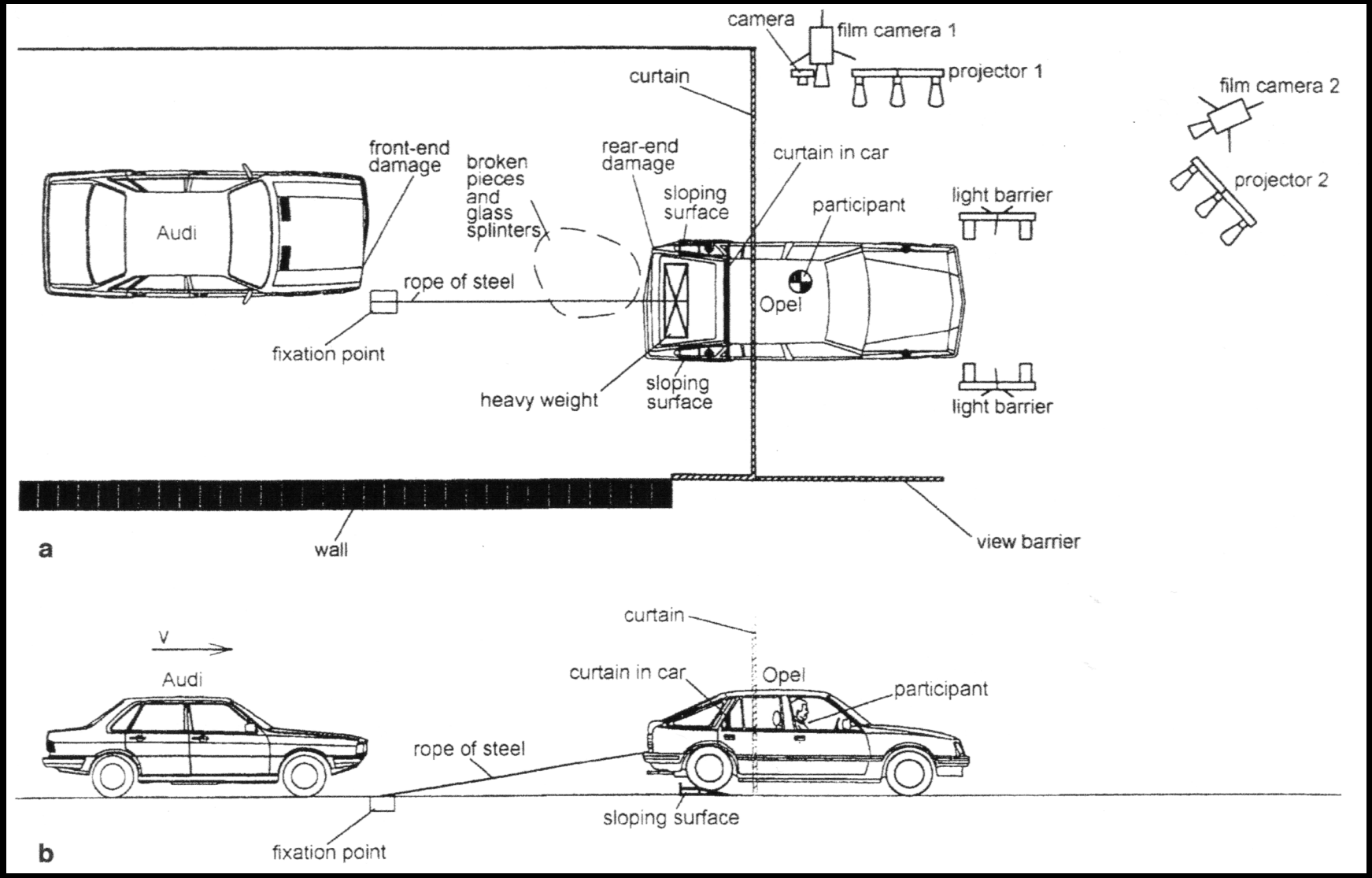
Witthoft M. Are Media Warnings About the Adverse Health Effects of Modern Life Self-Fulfilling? An Experimental Study on Idiopathic Environmental Intolerance Attributed to Electromagnetic Fields (IEI-EMF) Journal of Psychosomatic Research, 2012

- Healthy university volunteers watched a real TV report that promoted a link between exposure to Wi-Fi and symptoms.
- Next they received a 15-minute sham exposure to Wi-Fi signal.
- 54% reported symptoms such as tingling in the fingers and feet, pressure in the head, stomach aches, and trouble concentrating.
- 2 participants found the experience so unpleasant that they had to stop the sham Wi-Fi exposure before the time was up.

No Stress - No Whiplash, Castro et al, 2001

- 51 volunteers recruited through local newspapers.
- Told they will be involved in a rear-end collision.

No Stress - No Whiplash, Castro et al, 2001



No Stress - No Whiplash, Castro et al, 2001

- 20% of the subjects reported whiplash - like symptoms.
- Sham collision.
- None raised any doubts.

No Stress No Whiplash, Prevalence of Whiplash Symptoms following symptoms following exposure to a placebo rear-end collision Castro et al, 2001

- Subjects who reported whiplash - like symptoms:
  - Emotionally unstable.
  - Less content with their life.
  - More concerned about their health.

Somatization

- Voluntarily produce symptoms to assume the patient's role.
- Willing to undergo painful or risky procedures to receive sympathy and special attention.

Somatization

- Do not accept that their problems are psychiatric in origin.
- Request to be seen by other medical practitioners until the problem is found.
- Become a professional patient.
- An inner need to be seen as ill or injured.

Rate of Concussion WCB of Nova Scotia

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Concussion Specialist?

STAT | Reporting from the frontiers of health and medicine

Concussion Specialist?

By USHA LEE MCFARLING DECEMBER 16, 2015

Entrepreneurs looking to cash in on public anxiety over concussions are flooding the market with pricey products that have no scientific merit — and opening concussion clinics staffed by "specialists" with no expertise in brain trauma.

Concussion Specialist?

Many clinic directors market themselves as "credentialed" concussion management specialists, but that term has no medical meaning.

It just indicates they've completed training offered by a private company that sells a controversial computer test for evaluating concussions — and that promises to help its legions of trainees launch and market their own clinics.

Physiatry

- 5 years of subspecialty training in diagnosis and rehabilitation of brain injuries.
- Royall College of Physicians of Canada accredited program.

Concussion Specialist?

- Concussion – term used in sport.
- WCB does not cover sport injuries.
- The term should not be applied in WCB setting.
- Use well accepted diagnostic criteria (ACRM, WHO).

Concussion Specialist?

- Brain injuries are classified in three groups:

1. “Mild traumatic brain injury” (“concussion”)
2. “Moderate”
3. “Severe”

McCrory P., Consensus Statement in Concussion in Sport: The 4th International Conference on Concussion in Sport Held in Zurich, November 2012, Br J Sports Med, 2013

- The paper is a "consensus-based approach".
- "This document is developed primarily for use by physicians ….who are involved in the care of injured athletes…"
- It is not intended as a standard of care and should not be interpreted as such.

Concussion Specialist?

Concussion Specialist?

3

How do you feel?

"You should score yourself on the following symptoms, based on how you feel now".

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Trouble falling asleep	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6

Total number of symptoms (Maximum possible 22)

Symptom severity score (Maximum possible 132)

Iverson G. L., Factors Associated with Concussion-Like Symptom Reporting in High School Athletes, GAMA Pediatrics, 2015

- Healthy student athletes completed the ImPACT.
- "A large number of healthy student athletes with no pre-existing condition and no recent concussion report a cluster of baseline symptoms that resemble PCS".

Troy woman fakes brain injury, takes $480,000 from Boston Marathon bombing victims fund, officials say

Coakley said the claim alleged that Gause sustained a brain injury from the bombing and experienced long-term memory loss, impaired speech, and loss of some motor function that would require future surgery. Based on the information, Gause's claim was approved for payment.

Larrabee, G., Millis, S. & Meyers, J. 40 Plus or Minus 10, a New Magical Number: Reply to Russell. 2009

- Summary of the literature on the failure on validity tests in mTBI.

40% ± 10 failure rate.

Eugene Bleueler 1924

- To be sick while being paid to be sick is normal behavior.
- A person who does not claim for persistent symptoms after a compensable injury may well have had an unrecognized brain injury that has affected his judgment.

How to handle a problem neighbor?

Best Treatment

EDUCATION

Have faith and you will recover

- an old Arabic proverb

Symptom Expectation after Minor Head Injury. A comparative study between Canada and Lithuania, Clinical Neurology and Neurosurgery, Ferrari, Obelieniene, Russell, Darlington, Gervais, Green, 2001

- Canadians anticipated symptoms to last months or years.
- Lithuanian did not anticipate symptoms to persist.
- Expectations influence recovery from mTBI.
- Education play an important role in treatment.

EDUCATION, EDUCATION

- Whiplash: educational video, emphasizing a good prognosis was the most effective intervention

  Hurwitz, Spine, 2008

- Radiculopathy: education on benign nature of this condition and advice to stay active batter than exercise

  Fernandez M., Spine, 2015

- Concussion: a single education session and reassurance of positive outcome was the best treatment

  Paniak, Brain Injury, 2000

McCrea M. A. Mild Traumatic Brain Injury and Postconcussion Syndrome – The New Evidence Base for Diagnosis and Treatment, Oxford University Press, 2008

- A patient - information pamphlet states:
- “Mild head injury / concussion is a relatively common injury, which typically occurs from a blow to the head during sports, an accident, or a fall”.
- “This is common and not a cause for concern”.

McCrea M. A. Mild Traumatic Brain Injury and Postconcussion Syndrome – The New Evidence Base for Diagnosis and Treatment, Oxford University Press, 2008

- "You should not be alarmed if you have some symptoms after mild head injury. Some symptoms are expected".

- "Most symptoms following a mild head injury / concussion resolve in a short period of time, from days, weeks, or up to a few months, even without treatment.

McCrea M. A. Mild Traumatic Brain Injury and Postconcussion Syndrome – The New Evidence Base for Diagnosis and Treatment, Oxford University Press, 2008

- Symptoms persisting longer than 3-6 months are quite rare following mild head injury".

- It is also important to keep in mind that post concussive symptoms (example headaches, memory lapses) are experienced by all individuals from time to time in their daily lives, so one should not expect that recovery means a person will never experience the symptoms after head injury. Recovery is better defined as returning to your pre-injury baseline".

Alexander MP, Mild Traumatic Brain Injury, Neurology 1995

- Rehabilitation of brain injury must take place in real-life circumstances, specifically real-life vocational circumstances.

O'Neill J. The Effect of Employment on Quality of Life and Community Integration after Traumatic Brain Injury. G Head Trauma Rehabil, 1998

- Return to work is one of the most beneficial things that can happen to a patient with brain injury.

Results of 2 Randomized Control Trials

- Rehabilitation programs have no efficacy in rehabilitation of mild traumatic brain injury.

Ratj JF, Group Treatment of Problem Solving Deficits in Outpatients With Traumatic Brain Injury: A randomized outcome study. Neuropscyho Rehabil 2003

Ownsworth T, Comparison of Individual, Group and Combined Intervention Formatis in a Randomized Control Trial for Facilitating Goal Attainment and Improving Psychosocial Function Following Acquired Brain Injury. J Rehabil Med 2008

Do we need neuropsychological testing?

Whiplash and TBI

- Neuropsychological tests are not specific for head injury.

  Sim 1992, Suhr 1997

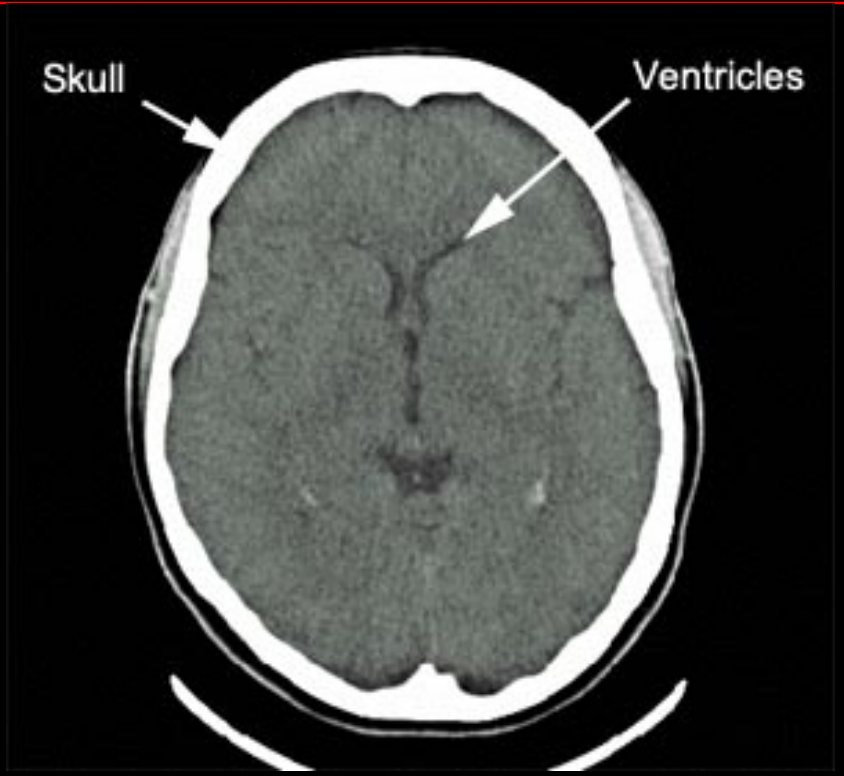
- Neuropsychological tests are not part of diagnosis criteria.
- Lack of motivation significantly influences the results.

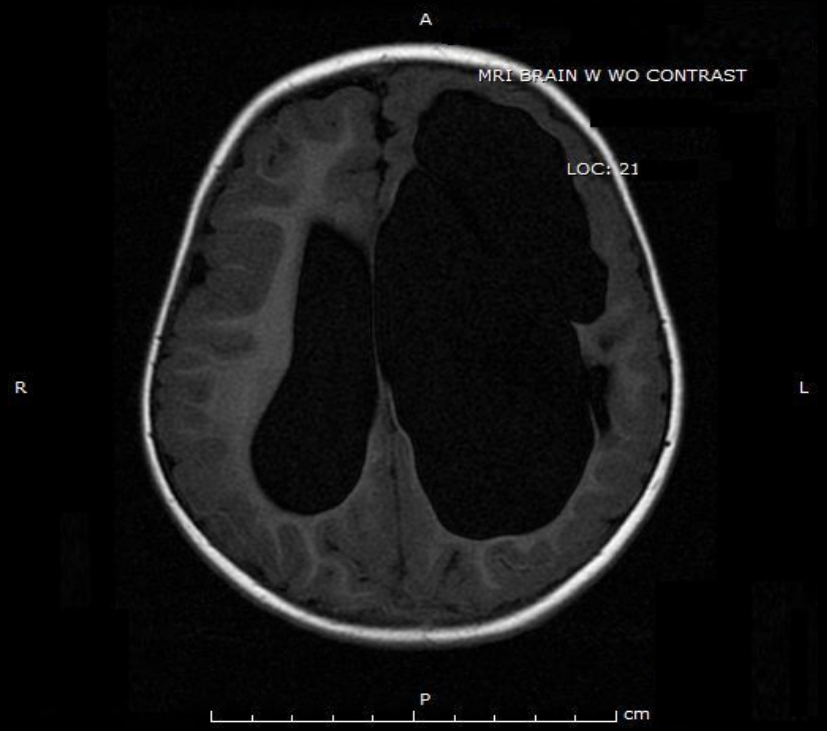
Larry and Bernard, 1990

neuropsychologists from Los Angeles

- Asked student volunteers to respond to the test as if they had been head injured in a traffic accident.
- “Neuropsychological memory tests are vulnerable to faked deficits”.

Who Should Be More Impaired ?

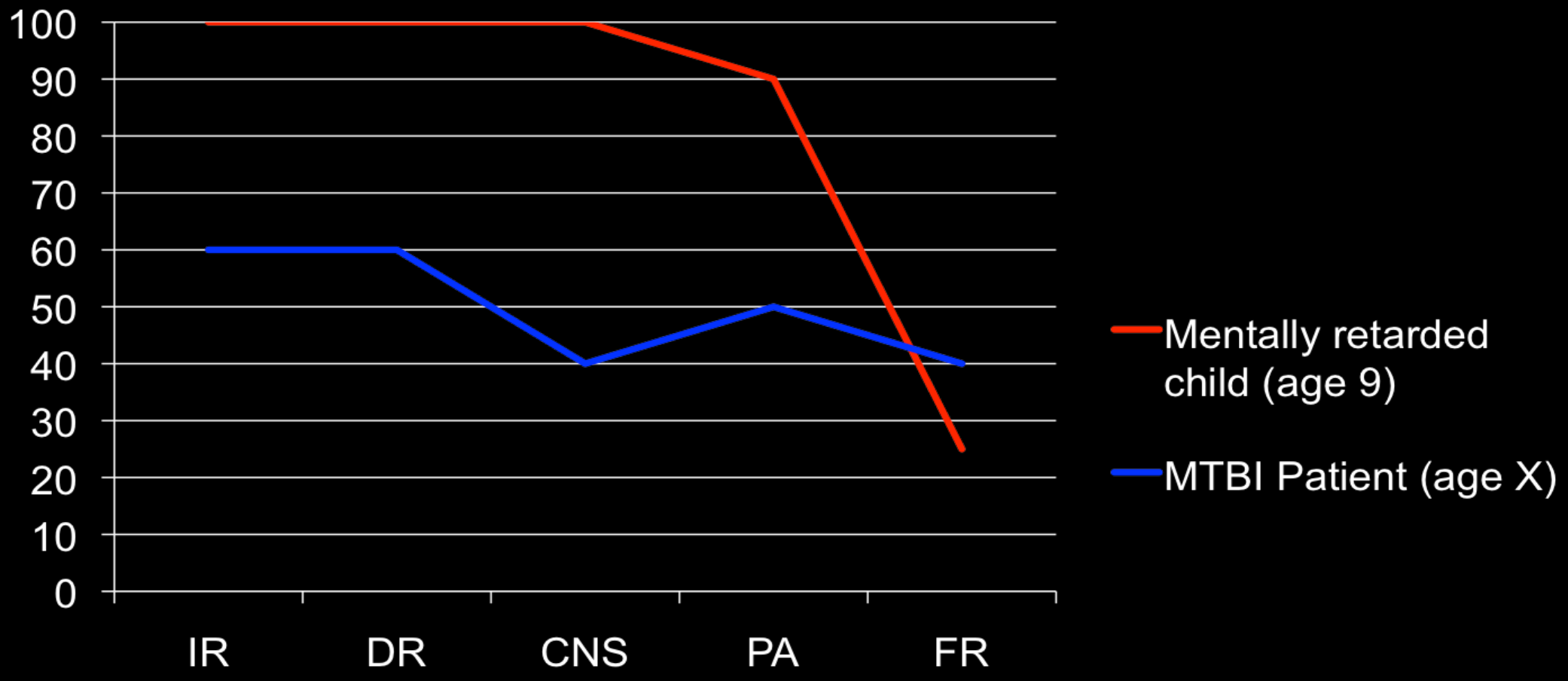




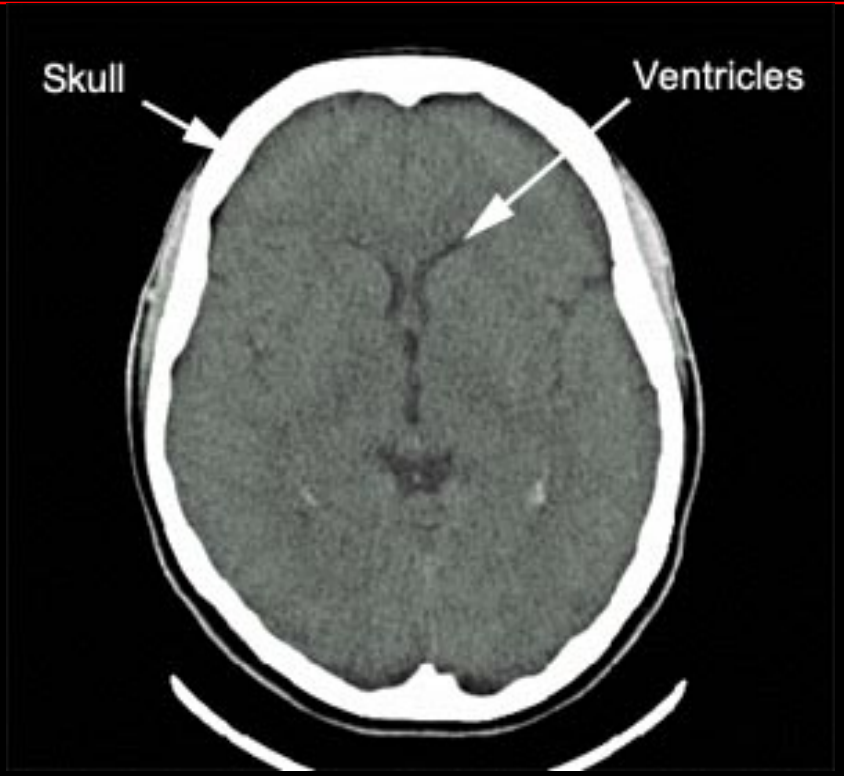
Case Study WCB

- 47 year old female.
- Diagnosed with concussion.
- Neuropsychological testing: “significant cognitive deficits in keeping with concussion”

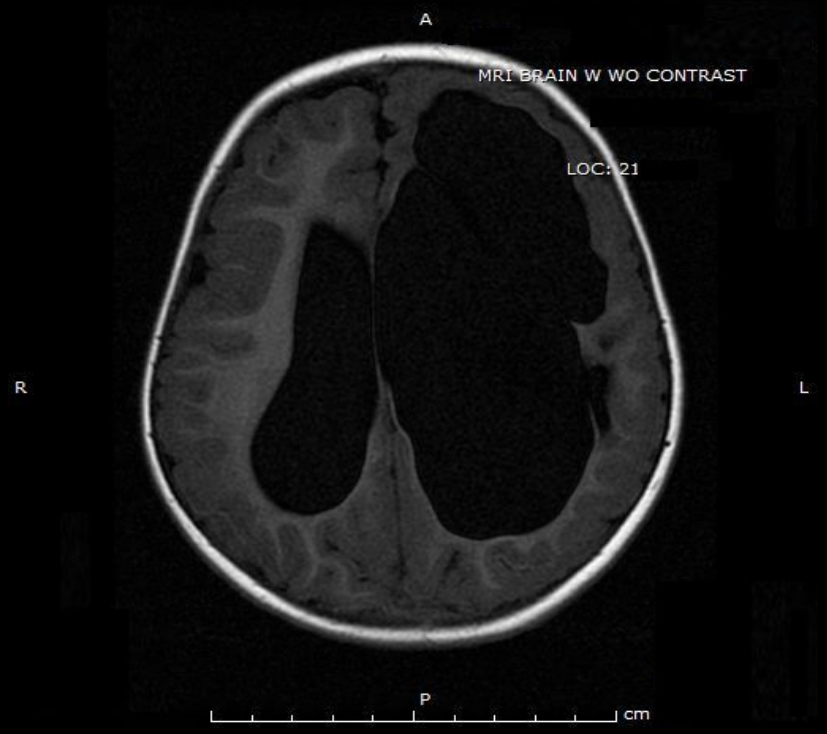
Results of Effort Testing (SVT)



Who Should Be More Impaired?



Concussion WCB case



9-year-old child, mental retardation, high dose BZD, severe brain tissue loss

Concussion and Eye Damage

- There is no anatomical reason why diffuse metabolic changes in the brain caused by mild TBI would affect eyes.
- Such injuries are caused by focal lesion.

Bengtzen R, (The “Sunglasses Sign” predicts nonorganic visual loss in neuro-ophthalmologic practice, Neurology, 2008

- 34 patients wore sunglasses.
- In general, the probability that a patient in that clinic had nonorganic visual loss was 0.043.
- However, this probability increased to 0.79 in individuals wearing sunglasses.

Bengtzen R, (The “Sunglasses Sign” predicts nonorganic visual loss in neuro-ophthalmologic practice, Neurology, 2008

- These individuals had at least 1 of the following:
  - High number of self-reported symptoms
  - WCB claim
  - Disability claim
  - Lawsuit

Bengtzen R, (The “Sunglasses Sign” predicts nonorganic visual loss in neuro-ophthalmologic practice, Neurology, 2008

- “Our study confirms that patients presenting with visual symptoms and wearing sunglasses should be strongly suspected to have nonorganic visual loss”.

Bengtzen R, (The “Sunglasses Sign” predicts nonorganic visual loss in neuro-ophthalmologic practice, Neurology, 2008

- “Unless patients have severe photophobia from obvious ocular disease, there is no reason they should keep their sunglasses on at all times”.

- Patients with real neuro-ophthalmologic disorders, such as optic neuropathies or visual losses from intracranial lesions, usually report decreased visual acuity with impaired contrast sensitivity and dimming of light and colors.

- These patients usually need brighter lighting to see better and tend to avoid sunglasses, rather than wearing sunglasses.

Prism Therapy

- Guidelines for Concussion / Mild Traumatic Brain Injury from the Ontario Neurotrauma Foundation. Module 10 (Persistent Vestibular and Vision Dysfunction).

- No research to support their conclusions.

Binder, Psychogenic Stuttering and Other Acquired Non Organic Speech and Language Abnormalities, Archives of Clinical Neuropsychology, 2012

- "…there is no reasonable neurological mechanism of mild TBI that would cause persistent language or fluency disorder…"
- "…. language abnormalities after a single, uncomplicated, mild TBI are unusual and should illicit suspicion of psychogenic origin".

Quiz Question 1

- 34 year old female, after a work injury.
- Lost consciousness for 2 min.
- 7 months later complains of headaches, memory and concentration problems, difficulty with word findings, fatigue, etc.

Quiz Question 1

- What is the least likely diagnosis:
  - Concussion
  - Depression
  - Somatization
  - PTSD
  - Malingering
  - Normal findings

Quiz Question 2

- 26 year old male, in an MVA.
- PTA for 30 min.
- 2 months later not improving.

Quiz Question 2

- What is the least likely diagnosis:
  - Concussion
  - Depression
  - Somatization
  - PTSD
  - Malingering
  - Normal findings

Quiz Question 2

- What is the % of people recovering from mTBI:
  - 0%
  - 5%
  - 15%
  - 50%
  - 100%

WCB Case Study

WCB Case Study

- 37 years old nurse.
- Diagnosis by a neurologist with “Severe Concussion”.
- Work injury in November 2011.
- Seen in February 2014.

WCB Case Study

- Health Form: “An O.R. nurse witnessed the injury”.
- In interview, ”This nurse was not there but came later”.
- Describe in detail how did the injury occur:
  - "Changing over O.R. suite in between cases, bent down to clean equipment; stood upright and hit top left frontal area of head on flat surface handle of overhead monitor, while going top speed, immediately fell to floor”.

WCB Case Study

- Describe what happened immediately after the injury.
  - Remembers saying to herself "I will have headaches from this". Remembers immediate onset of posterior neck pain, the nurse came and asked her whether she was okay".
- No loss of consciousness.

WCB Case Study

- Remembered the bang to the head.
- Continued with the shift on that day.
- 24 hours later started to experience "symptoms of concussion".
- She was working on the computer and, looking at the screen, made her feel as if she was going to fall.

WCB Case Study

- In the Health Form indicated that she developed:
  - “Neck pain, headaches, dizziness, irritability, poor sleep, poor concentration, poor memory, intolerance of stress and emotions, problems with the eyes, ears, confusion, pressure changes and even gait/balance problems”.
- All the symptoms are getting worse.

WCB Case Study

- The physiotherapist's report of December 2011
  - The client has suffered concussion and whiplash.

- Family physician report of December 2011
  - Diagnosis of "concussion" and "neck strain".
  - Neurological examination was normal.

WCB Case Study

- Neurologist's report of March 2012:
  - Used no diagnostic criteria at all.
  -
  - Physical examination was normal.
  - ”Patient has sustained a ‘ mild concussion".
  - “I request an MRI of the head”.
- The MRI of the brain of June 2012 was normal.

WCB Case Study

- Neuropsychologist report of May 2012:
  - Her higher level of executive skills was intact.
  - She has outstanding fine motor coordination abilities.
  - Her visuospatial skills are intact.

WCB Case Study

- Neuropsychologist report of May 2012:
  - The only difficulty was the relatively weaker, but normal language skills.
  - “Although this is a subtle finding, it does line up with the site of the blow to the left frontal parietal region of the skull".
  - Diagnosis “Concussion”

WCB Case Study

- “Specialist” of “concussion clinic report of October 2013:
  - She suffered an "ocular vestibular concussion”.
  - Referral to occulo-vestibular therapy.
  - Optometry luminosity program to help with cognitive therapy.

WCB Case Study

- “Specialist” of “concussion clinic report of October 2013:
  - Referred for massage therapy for myofascial pain "from the supra-orbital nerve” and “the greater occipital nerve trigger points”.
  - 8-10 cups of water a day.
  - Eat regularly carbohydrates and proteins.
  - Limiting physical activities as required.

WCB Case Study

- Psychiatrist's report of November 2012
  - Contributing factor are unconscious emotions and anxiety.
  - "I explained to her that this does not mean that she did not have a concussion, rather it means at least that there is significant emotion factors that might be treatable".

WCB Case Study

- Chief complaints:
  - Concussion (affecting the cerebellar system, significant ocular issues, motion sensitivity and cognitive issues, dizziness, light sensitivity, memory, concentration, focus, etc.
  - Neck/injury (WAD type II).
- 8 pages hand written document describing symptoms.

WCB Case Study

- Believes that neck is compressed and a nerve is pinched.
- Believes that concussion “caused issues with the occipital nerve”.
- Showed the IMPACT Assessment, which revealed “many problems with my health”.
- Mentioned the neuropsychological assessment, which found “cognitive deficits related to exactly the lump in the head”.

WCB Case Study

- She is not satisfied with the treatment so far.
- Physiotherapy increased the “concussion issues”.
- Acupuncture made pain worse.

WCB Case Study

- Still asking for more treatments.
- Mentioned numerous times “Concussion doctor knows what is wrong with me”.
- “WCB is not approving her treatment recommendations”.

WCB Case Study

- Past medical history of
  - Migraines starting at age 10, on Zomig for years.
  - Had a concussion at age 4 but recovered.
  - Had a history of chronic back pain.
  - Had depression for years.

WCB Case Study

- Has financial and marital stressors.
- Employer dissatisfaction.
- The injury is the fault of the employer.

WCB Case Study

- Describes pain as “severe - it is ruining my quality of life”.
- Health Form asked to describe a typical day:
  - “She indicated that she wakes up at 7:30, gets her young daughter ready for school, takes her to school, and then comes home by 8:30. Then she performs housework and household chores until 12:00. She does groceries, bending, etc. She takes a nap between 12:00 and 2:00. Between 2:00 and 4:00 she continues with household chores and tasks. Between 4:00 and 6:00 she prepares supper. Between 6:00 and 8:00 she does "kid's stuff", such as lunches, bath, schoolwork, and spending quality time. She goes to bed between 10:00 and 10:30”.

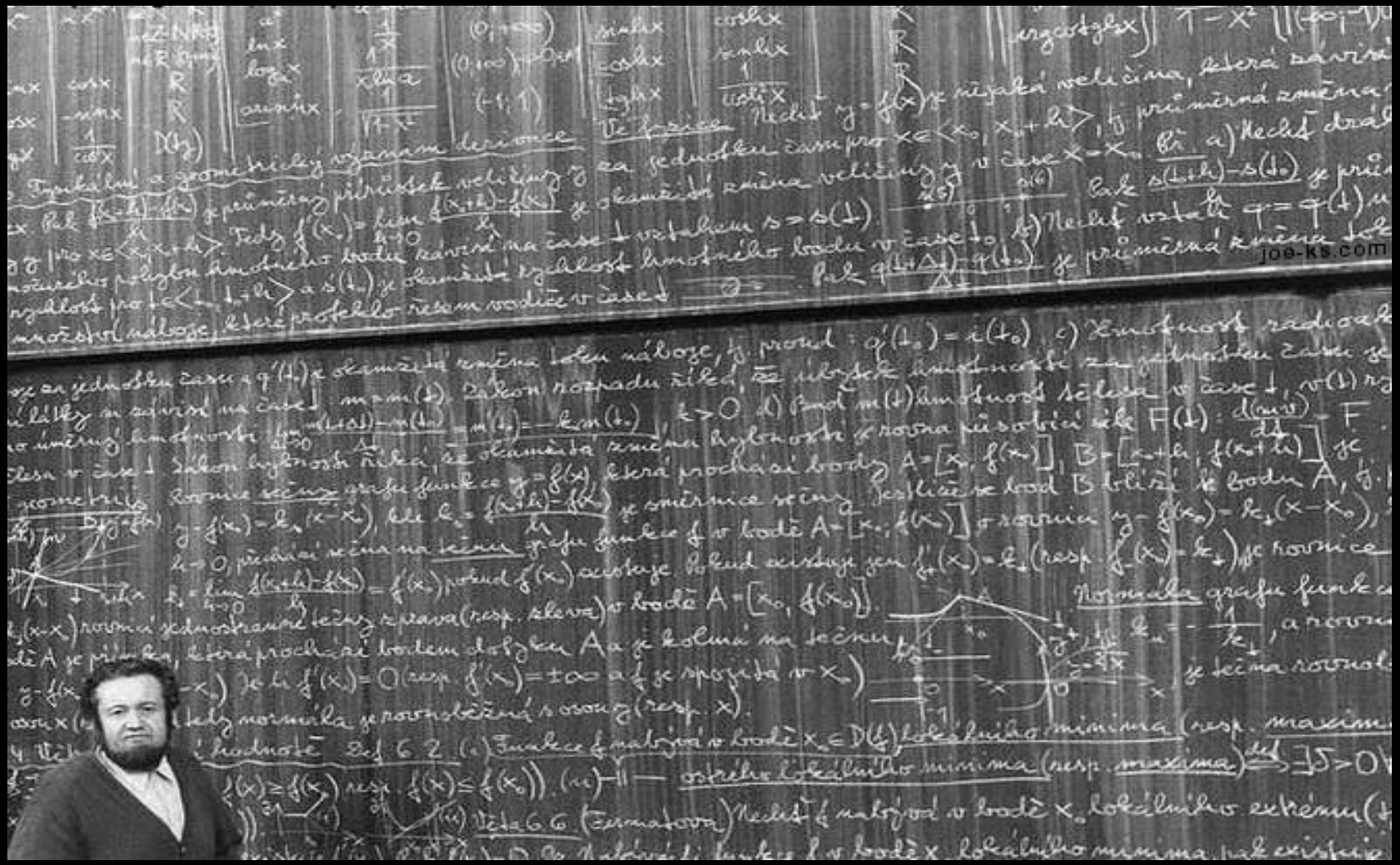
WCB Case Study

- Not even one medical practitioner ever mentioned diagnostic criteria for concussion.
- Normal physical examination.
- Normal imaging studies of the brain.
- Past and present psychosocial issues were ignored.

Return To Work

- No restrictions for return to work.
- The brain does not become injured with activity.
- The only treatment: education.
- Probably too late.

Nothing like a long answer to a short question...



- The 2 most commonly-cited diagnostic criteria
  - International Classification of Disease 10th edition (ICD-10)
  - DSM-IV

- None of the criteria are better than the other.
- They are fraught with similar limitation, reliability, and validity.