

Fatigue

Carolyn McMakin, MA, DC
May 2022

1

What is fatigue?

- Fatigue is a feeling of **constant tiredness or weakness**.
- It can be physical, mental or a combination of both.
- “Emotional” causes of fatigue are actually caused by combination of physical and mental.
- “Emotions” do not come from space. They come from particular neurotransmitters affecting specific parts of the brain that create specific feelings we name as certain emotions.
- Fatigue can affect anyone, and most adults will experience fatigue at some point in their life.
- Fatigue is a symptom, not a condition and it has many causes

2

The Most Common Cause of Fatigue

3

Fatigue associated with Sleep deprivation

- There are three types of fatigue associated with sleep deprivation:
- **Transient:** Transient fatigue is acute fatigue brought on by extreme sleep restriction or extended hours awake within 1 or 2 days.
- **Cumulative:** brought on by repeated mild sleep restriction or extended hours awake across a series of days
- **Circadian:** Reduced performance during nighttime hours, particularly during an individual’s “window of circadian low”, 2:00am and 6:00am

4

Sleep Deprivation & Your Body

Increases Appetite
When you're sleep deprived, your metabolism slows down, and this means that you'll have stronger cravings. High calorie foods, sweets, and snacks become particularly tempting, and cravings are likely to be ignored as your body demands an instant hit of energy. The energy provided by these types of foods creates a vicious cycle, during which you briefly feel better, but start followed by a slower burning state which eventually puts more weight on you. At the end of a day spent experiencing such a rollercoaster of highs and lows it's difficult to sleep and the cycle of temptation, waking and start again, rising an unhealthy diet and obesity.

Impairs Memory & Learning
Certain phases of sleep are known to involve memory consolidation, strengthening your ability to learn by interrupting or missing out on these phases through sleep deprivation it may how effectively you remember the information. This can be noticeable not just when you're actually trying to learn something, but also in your day-to-day life.

Shortens Attention
Just as your body needs energy to perform, so does your mind. Coming into the day with low energy means that you're less able to focus your attention, making it harder to carry out mental tasks that your ordinary mind would be capable of. In addition, when your attention is demanded (such as in a work environment) becomes difficult, unpredictable and, other quality, even more long.

Worsens Mood
Remains unsurprisingly, experiencing the more negative aspects that it causes. Chronic sleep deprivation is closely linked to irritability, bad temper and a generally low mood. With low energy levels, a shortened concentration span, dulled decision-making and high stress levels it's not hard to see how your mood can suffer when you're sleep deprived.

Decreases Activity
Exercise is closely linked to diet and energy levels, and it's no surprise to discover that when you're sleep deprived you're likely to be less active during the day. A less active lifestyle is another fast-track to health problems.

Slows Reactions
Poor levels of energy reduce the speed in which your brain can process visual information, leading to slower reaction times. The results of this can be poor productivity, drowsy driving and a general feeling of sluggishness. Some studies have reported a drop in performance when sleep deprived to that of being under the influence of excess alcohol. It is estimated that around 20% of traffic accidents are directly related to drowsy driving, underlining the seriousness of this issue.

Agers Skin
Chronic sleep deprivation increases the body's production of cortisol, the stress hormone, which in turn breaks down collagen, a vital component in keeping skin supple and healthy. A 2013 study found that lack of sleep contributes to the lines, uneven pigmentation and reduced skin elasticity, as well as lowering the skin's ability to withstand exposure to sunlight and environmental factors. As well as these longer term impacts of sleep deprivation on the skin, an almost immediate result is 'bags' under the eyes - meaning a bad night's sleep probably visible in the morning.

Weakens Immune System
Feeling physically 'run-down' is a problem when you're not sleeping well, as your body is missing out on the night's recovery and rejuvenation that sleep brings. In such a situation you're more susceptible to major illnesses like common colds and flu, you're not able to fight off infections as easily as you should be. A weakened immune system is yet another 'vicious circle' caused by sleep deprivation - you're sleep poorly, you feel poorly, and you struggle to sleep well.

5

Effects of Sleep Deprivation

- Irritability
- Cognitive impairment
- Memory lapses or loss
- Impaired moral judgement
- Severe yawning
- Hallucinations
- Symptoms similar to ADHD
- Impaired immune system
- Risk of diabetes Type 2
- Increased heart rate variability
- Risk of heart disease
- Increased reaction time
- Decreased accuracy
- Tremors
- Aches
- Other:
 - Growth suppression
 - Risk of obesity
 - Decreased temperature

6

Negative Side Effects of SLEEP DEPRIVATION

SHABI CIRCLE SHABI CIRCLE

- BRAIN**
 - Irritability
 - Cognitive impairment
 - Memory lapses or loss
 - Impaired moral judgement
 - Decreased creativity
 - Increased stress
 - Symptoms similar to ADHD
- GUT**
 - Impaired immune system
 - Difficulty digesting
 - Leaky gut
- OTHER**
 - Growth suppression
 - Risk of obesity
 - Decreased temperature
 - Higher risk of injury
 - Higher risk of cancer
- HEART**
 - Increased heart rate variability
 - Risk of heart disease and stroke
 - Hypertension
- MUSCULAR**
 - Increased reaction time
 - Decreased accuracy
 - Tremors
 - Aches
- PANCREAS**
 - Increased risk of type II diabetes

7

The Irony

As clinicians we work with patients to correct fatigue, leaky gut, improve insulin resistance, reduce hemoglobin A1C, reduce BMI and weight, address cardiac risk and HsCRP, hypertension, depression and rarely or never ask them about their sleep.

- BRAIN**
 - Irritability
 - Cognitive impairment
 - Memory lapses or loss
 - Impaired moral judgement
 - Decreased creativity
 - Increased stress
 - Symptoms similar to ADHD
- GUT**
 - Impaired immune system
 - Difficulty digesting
 - Leaky gut
- OTHER**
 - Growth suppression
 - Risk of obesity
 - Decreased temperature
 - Higher risk of injury
 - Higher risk of cancer
- HEART**
 - Increased heart rate variability
 - Risk of heart disease and stroke
 - Hypertension
- MUSCULAR**
 - Increased reaction time
 - Decreased accuracy
 - Tremors
 - Aches
- PANCREAS**
 - Increased risk of type II diabetes

8

Sleep Debt

- “Sleep debt” is defined as having an hour less of sleep for several consecutive days needs a series of days of more-than-usual sleep for a person to fully recover from cumulative fatigue
- Sleep debt, also known as sleep deficit, is **the difference between how much sleep you need and how much you actually get**. When you sleep fewer hours than your body needs, you have a sleep debt.
- Research shows that the brain remembers “sleep debt” and when allowed to sleep freely you will make up sleep debt for over a year
- Sleep debt adds up over time and will negatively impact your health.

9

Consequences of Fatigue associated with Sleep Debt

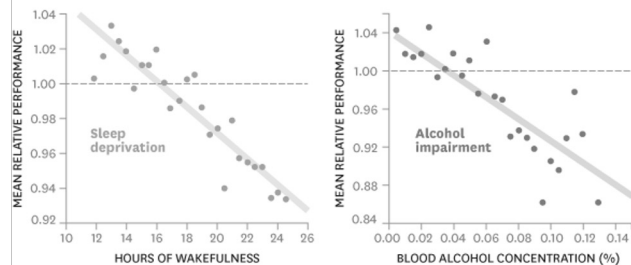
- Fatigue associated with sleep debt creates impaired standards of operation with increased likeliness of error, injury, accidents and death, inaccurate flying, driving or performing any task
 - Missed radio calls or task notifications
 - Indicators of equipment malfunction being missed
 - Routine tasks performed inaccurately or missed
 - Poor decision making
 - Slow reaction to changing situation
 - Failure to notice changing situation
 - Loss of situational awareness
 - Forgetfulness
 - Falling asleep without knowing it
 - Micro-Sleep - being asleep unaware with eyes open

10

Consequences of Sleep Deprivation and Sleep Debt

THREE SHEETS TO THE WIND

Research shows the effect on performance of even a moderate level of fatigue is equivalent to or greater than what is considered acceptable for alcohol intoxication.



SOURCE DREW DAWSON AND KATHRYN REID'S "FATIGUE, ALCOHOL, AND PERFORMANCE IMPAIRMENT," NATURE VOL. 388, JULY 1997.

HBR.ORG

11

Clinical Approach

- The first history question for any patient with a complaint of fatigue, body pain, hypertension, weight gain or depression
- How many hours do you sleep?
- What time do you go to bed?
- What do you do just before you go to bed?
 - Screen time?
 - Exercise?
- What is your sleeping situation?
 - Noise
 - Light
 - How old is your mattress
 - Sleep disruptors – small children, pets, neighbor noises, pain
- How can we address or change any of these?
 - Ear plugs
 - Eye masks
 - New mattress
 - Put pets outside of the bedroom
 - Create better pain management

12

Clinical Approach

Tell the patient

MAKE SLEEP A PRIORITY

“If you want to stay alive and healthy,
sleep is your only priority for the next 6 months
I want you to keep a sleep diary and see me in one month”

13

Don't do Nothing.
At the first visit, DO something.

- Assessment
 - Salivary cortisol x 4
 - TSH, T4, T3, Anti-thyroid anti-bodies
- Suggest Sleep hygiene
 - Reduce noise, light, improve mattress comfort, reduce sleep disruptors, avoid alcohol
- Medication as tolerated
- Non-Prescription
 - Melatonin
 - 5-HTP
 - Magnesium
 - Anti-histamines – histamine is neurotransmitter that mediates alertness
 - GABA / Taurine
- Prescriptions – Find one that is tolerated
 - Ambien, Lunesta, Restoril, Sonata, Halcion, Trazadone, Gabapentin, Flexeril

14

Other Causes of Fatigue

- Sleep apnea
- Heart disease
- Infection
- Autoimmune disease
- Hormonal imbalance
 - Estrogen
 - Testosterone
- Histamine and IgG macrophage mediated illness
- Traumatic brain injury
 - Sleeping for recovery
 - Sleeping due to hormonal imbalance associated with TBI
- Depression
- Growth hormone deficiency

15

Rule Out the Worst First

16

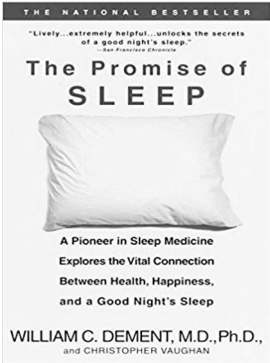
Rule out Sleep Apnea

17

Sleep Apnea

Causes Hypertension, Heart Attack, Stroke and Lethal Accidents

- The Promise of Sleep
 - by William Dement, MD, PhD
- This book will convince you that sleep apnea is a fatal condition
- Any patient who requires more than one anti-hypertension medication is likely to have moderate sleep apnea
- Any patient who had a stroke or heart attack at night, died of sleep apnea



18

Sleep Apnea Causes


- Hypertension
- Stroke
- Heart Attacks
- Weight gain
- Type 2 diabetes
 - Elevated stress levels, insulin and leptin resistance
- Daytime “micro sleeps” resulting in
 - Daytime fatigue
 - Fatal auto accidents
 - Falls

19

Clinical Approach

Rule out Sleep Apnea First

- Sleep Apnea is the most serious and routinely fatal cause of fatigue
- Hospital sleep studies are expensive, inconvenient, rarely accurate
- In-home sleep studies now available through various companies
- Watch PAT (Peripheral Arterial Tomography)
 - Obstructive and Central
- Z machine – General Sleep



20

Correcting Sleep Apnea is Urgent Apnea Solutions

- CPAP, Bi-Pap
- Overcome patient resistance by describing the CPAP and mask options
 - Variable pressure CPAP units are available
 - Many types of masks available – It takes time to find the right one
 - Describe the learning curve for using the CPAP and masks 3- 6 months
- Be willing to scare them into using a CPAP by describing their sleep apnea as a fatal condition
- Give the option of using a CPAP while pursuing alternatives
 - The surgeries can be successful but take too long
 - The nose and mouth appliances are not universally successful
- Schedule the patient for F/U in 2-4 weeks. Press for compliance

21

Rule Out Heart Failure, Heart Disease

22

Heart Disease / Heart Failure

- Fatigue is the most subtle symptom of heart disease that occurs prior to chest pain / angina, peripheral edema or shortness of breath.
- Especially in women



23

Correlates of Fatigue in Patients With Heart Failure

Prog Cardiovasc Nurs. 2008 Winter; 23(1): 12–17.

- High levels of fatigue were reported in 50.4% of men and 51.2% of women. In a multivariate model, maximal workload, physical health, emotional health, and depression explained 51% of the variance in fatigue ($P < .001$). Fatigue in patients with HF is associated with both clinical and psychosocial variables, offering a number of targets for intervention. These findings suggest the need for multiple risk factor intervention strategies that improve physical and emotional health to decrease fatigue. Patients with depression warrant particular scrutiny.
- Fatigue is one of the 2 most common symptoms (along with dyspnea) reported by patients with heart failure (HF).^{4,7} Also commonly referred to as activity intolerance, fatigue in patients with HF is defined as persistent tiredness and the perception of difficulty performing daily activities because of this persistent tiredness. Fatigue is often one of the first symptoms of HF and is commonly overlooked because it is viewed by both lay people and health care providers as a vague complaint.

24

Clinical Approach for Fatigue

- Any patient, female or male, over the age of 40 whose primary complaint is fatigue should have a
 - Sleep Study – in home, whether they think they snore or not.
 - Baseline EKG, BMP, HsCRP and lipids done to rule out cardiac dysfunction
- The patient should be evaluated for heart failure.
 - Refer to cardiologist if necessary
- ASK about the other common mild symptoms that other clinicians ignore.

25

Rule out Infection and Autoimmune disease

26

Infection and Autoimmune Disease Cause Fatigue

- Interleukin 1 causes fatigue
 - Illness behavior in mice when IL-1 is injected
- Interleukin 1 increases when there is acute or chronic infection and autoimmune disease
- “Central nervous system plays an important role in the perception of fatigue. The central nervous system processes and values sensory information.... (and) guides motivational behavior involving decisions to discontinue activity or to invest effort” J Neuroinflammation. 2017; 14: 16.
- Interleukin(IL-)-1 is the prototype of a proinflammatory cytokine, produced in response to infection and other forms of trauma. Immun Infekt 1992 Aug;20(4):128-33
- Fatigue sensation following peripheral viral infection is triggered by neuroinflammation. Neural Regen Res. 2015 Feb; 10(2): 203–204.

27

Clinical Approach Rule out Infection

- Blood tests – evaluate white count
 - Not all infections elevate white count
- 3-D cone beam – rule out occult dental infection
- Urine mold screen
- Sinus CT if symptomatic
- Mono spot test – R/O mononucleosis
- R/O HIV, Influenza
- Evaluate Lyme, borrelia, babesia with blood work
- Measuring IL-1 has not been shown to be useful. It doesn't demonstrate the source

28

Clinical Approach Rule out Autoimmune Disease

- Choose potential autoimmune tissue targets based on history and symptoms
- **Blood Tests for Autoimmune Diseases**
 - C-Reactive Protein (CRP)
 - Erythrocyte Sedimentation Rate (ESR)
 - Antinuclear Antibodies (ANA)
 - Ferritin.
 - Enzyme-linked Immunosorbent Assay (ELISA)
 - Rheumatoid Factor (RF)
 - Anti-cyclic Citrullinated Peptide (Anti-CCP) Antibodies.
 - Immunoglobulins.
 - Anti thyroid antibodies

29

Rule Out Hormone Imbalance

30

Hormone Imbalance Can Lead to Fatigue

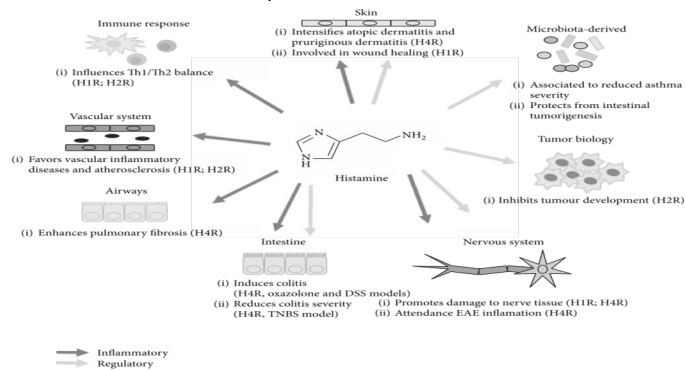
- Test all of these in any patient after a TBI
 - TBI and mTBI cause reductions in pituitary regulatory hormones
- Test salivary cortisol x 4
- Test: Thyroid, TSH, Anti-thyroid antibodies
 - If antibodies elevated, enzyme cannot remove iodine #4 to make storage form T4 into active form T3.
- Women – Test salivary and blood levels of hormones
 - Estrogen dominance/ progesterone deficiency
 - Perimenopause, adolescence, post menopause
 - Testosterone deficiency (post menopausal)
- Men – test Growth hormone IgF1, testosterone and binding globulins
 - Low growth hormone leads to fatigue and depression
 - Testosterone deficiency leads to sleep disturbance and fatigue
 - If supplementing testosterone, use clomid to maintain central signaling

31

Consider Histamine and Fatigue

32

Role of Histamine in Modulating the Immune Response and Inflammation



33

Histamine is Complicated

- Role of Histamine in Modulating the Immune Response and Inflammation, Volume 2018 | Article ID 9524075 | <https://doi.org/10.1155/2018/9524075>
- Four different histamine receptors H1R, H2R, H3R, H4R
 - H1R is expressed in various cell types, such as neurons, endothelial cells, adrenal medulla, muscle cells, hepatocytes, chondrocytes, monocytes, neutrophils, eosinophils, DCs, T cells, and B cells. Increases eosinophils, neutrophils, antigen presenting cells. Th1 responses
 - H2R regulates Th2 responses, is expressed by parietal cells of the gastric mucosa, muscle, epithelial, endothelial, neuronal, hepatocyte, and immune cells. H2R antagonizes some of the effects mediated by H1R and leads to the relaxation of smooth muscle cells, causing vasodilation. H2R activation regulates several of the functions mediated by histamine, including cardiac contraction, gastric acid secretion, cell proliferation, and differentiation
 - Activation of H1R and H2R mainly account for mast cell- and basophil-mediated allergic disorders

34

Histamine is Complicated

- H3R functions were identified in the central nervous system and peripheral and presynaptic receptors to control the release of histamine and other neurotransmitters. H3R inhibits acetylcholine and therefore affects vagus nerve functions and cortical functions that depend on Ach.
- H3R mediates the waking state, creates alertness. H3R may have some protective effects for dopaminergic neurons
- H4R H4R is preferentially expressed in the intestine, spleen, thymus, bone marrow, peripheral hematopoietic cells, and cells of the innate and adaptive immune systems. Expression of H4R is regulated by stimulation with IFN, TNF- α , IL-6, IL-10, and IL-13, leading to inhibition of cAMP accumulation and activation of MAPK (mitogen-activated protein kinases) by H4R.
- Histamine initiates the inflammatory cascade
- In the brain, histamine mediates alertness

35

Histamine, Allergies and Fatigue

- IgG antibodies to food, mold and environmental allergens form antigen/antibody complexes that are taken up by macrophages.
- Macrophages burst releasing histamine that stimulates systemic inflammation (IL-1) causing fatigue.
- Systemic histamine causes alertness and increases epinephrine and norepinephrine in the CNS leading to sleep disturbance which leads to fatigue.
- Class C multi-modal unmyelinated pain fibers are sensitive to histamine which leads to diffuse low grade body pain which can lead to sleep disturbance and fatigue.

36

Clinical Approach Histamine Mediated Fatigue

- Test IgE, IgG food allergies and sensitivities
- Different Laboratories – Your preference
 - Do matched samples at least once no matter how good the lab PR is
- Test hsCRP
- Test intestinal permeability

37

TBI and mTBI Cause Fatigue

38

Traumatic Brain Injuries TBI and mTBI Auto Accidents, Falls, Sports injuries

You have to ASK

The time between the TBI or mTBI and the fatigue complaint may be so great that the patient may think they are unrelated and may list the TBI/mTBI as an afterthought or may not list it at all in the history

39

TBI and mTBI Cause Fatigue

- Brain injuries can directly lead to fatigue
- Brain injuries lead to hormone deficiencies that lead to fatigue
- Brain injuries lead to sleep disturbances that lead to fatigue

40

TBI and mTBI History Questions

- Have you ever had a concussion?
- What sports did you play?
 - Soccer
 - Football
 - Basketball
- Have you ever had an auto accident?
 - When was your accident?
 - What kind of car were you driving? What kind of car hit you? Or What did you hit?
- Have you ever had a fall where you hit your head?
- What do you do for fun?
 - Do you ride mountain bikes?
 - Have you ever ridden horses? Ever fall off a horse?
 - Do you / did you ever snow or skate board, snow or water ski?

41

Traumatic Brain Injuries and Fatigue

- Factors Contributing to Chronic Fatigue After Traumatic Brain Injury, Schnieders, Jessica MD; Willemsen, Dennis MD; de Boer, Hans MD, Journal of Head Trauma Rehabilitation: [November/December 2012 - Volume 27 - Issue 6 - p 404-412](#)
- The annual incidence of traumatic brain injury in Europe amounts to 235 per 100,000 persons. About two-thirds will develop posttraumatic brain injury chronic fatigue (pTBI-CF).
- Findings: Vitamin D deficiency was found in 65%, poor sleep quality in 54%, anxiety disorders in 36%, growth hormone deficiency in 16%, and gonadal hormone deficiencies in 9%. Fatigue severity was correlated with poor sleep ($R = +0.65$, $P < .0001$), serum 25-hydroxy vitamin D levels ($R = -0.50$, $P < .0001$), and anxiety ($R = +0.50$, $P < .0001$) but not with growth hormone deficiency or gonadal hormone deficiencies. The first 3 factors together explained 59% of the fatigue score variance.
- Conclusions: Poor sleep, vitamin D deficiency, and anxiety were the most important factors associated with pTBI-CF. Appropriate treatment of these disorders may help to reduce fatigue in these patients.

42

Traumatic Brain Injuries and Fatigue

- Using Functional Magnetic Resonance Imaging to Detect Chronic Fatigue in Patients With Previous Traumatic Brain Injury: Changes Linked to Altered Striato-Thalamic-Cortical Functioning, Berginström, Nils MSc; Nordström, Peter PhD; Ekman, Urban PhD; et al, Journal of Head Trauma Rehabilitation: [July/August 2018 - Volume 33 - Issue 4 - p 266-274](#)
- **Participants:** Patients with TBI ($n = 57$) and self-experienced fatigue more than 1 year postinjury, and age- and gender-matched healthy controls ($n = 27$).
- **Main Measures:** Self-assessment scales of fatigue, a neuropsychological test battery, and fMRI scanning during performance of a fatiguing 27-minute attention task.
- **Results:** During testing within the fMRI scanner, patients showed a higher increase in self-reported fatigue than controls from before to after completing the task ($P < .001$). The patients also showed lower activity in several regions, including bilateral caudate, thalamus, and anterior insula (all $P < .05$). Furthermore, the patients failed to display decreased activation over time in regions of interest: the bilateral caudate and anterior thalamus (all $P < .01$). Left caudate activity correctly identified 91% of patients and 81% of controls, resulting in a positive predictive value of 91%.
- **Conclusion:** The results suggest that chronic fatigue after TBI is associated with altered striato-thalamic-cortical functioning. It would be of interest to study whether fMRI can be used to support the diagnosis of chronic fatigue in future studies.

43

mTBI and Fatigue

- Recovery from mild traumatic brain injury, A focus on fatigue, [Maja Stulemeijer M.Sc, Sieberen van der Werf, Gijs Bleijenberg, Jan Biert, Jolanda Brauer & Pieter E.Vos, Journal of Neurology volume 253, pages 1041–1047 \(2006\)](#)
- **Background:** Fatigue is one of the most frequently reported symptoms after Mild Traumatic Brain Injury (MTBI). To date, systematic and comparative studies on fatigue after MTBI are scarce, and knowledge on causal mechanisms is lacking.
- **Objectives:** To determine the severity of fatigue six months after MTBI and its relation to outcome. Furthermore, to test whether injury indices, such as Glasgow Coma Scale scores, are related to higher levels of fatigue.
- **Methods:** Postal questionnaires were sent to a consecutive group of patients with an mTBI and a minor-injury control group, aged 18–60, six months after injury. Fatigue severity was measured with the Checklist Individual Strength. Post-concussional symptoms and limitations in daily functioning were assessed using the Rivermead Post Concussion Questionnaire and the SF-36.
- **Results:** A total of 299 out of 618 eligible (response rate 52%) MTBI patients and 287 out of 482 eligible (response rate 60%) minor-injury patients returned the questionnaire. Ninety-five MTBI patients (32%) and 35 control patients (12%) were severely fatigued. Severe fatigue was highly associated with the experience of other symptoms, limitations in physical and social functioning, and fatigue related problems like reduced activity. Of various trauma severity indices, nausea and headache experienced on the ED were significantly related to higher levels of fatigue at six months.
- **Conclusions:** In conclusion, one third of a large sample of MTBI patients experiences severe fatigue six months after injury, and this experience is associated with limitations in daily functioning. Our finding that acute symptoms and mechanism of injury rather than injury severity indices appear to be related to higher levels of fatigue warrants further investigation.

44

Vestibular Injuries and Fatigue

Vestibular injuries cause fatigue
 Vestibular injuries are often concurrent with mTBI and TBI
 but cause distinct and separate symptoms

45

THE TRUTH ABOUT CONCUSSION

A concussion is a mild traumatic brain injury (mTBI). Most concussions occur without losing consciousness.

EFFECTS OF TRAUMA

Trauma can cause vestibular dysfunction

- DIZZINESS
- VERTIGO
- BLURRED VISION
- IMBALANCE
- FATIGUE
- FALLS

SYMPTOMS

THINKING: Difficulty concentrating, memory

EMOTIONAL: Irritability, sadness

PHYSICAL: Headache, dizziness

SLEEP: More/less than usual

COMMON CAUSES

FALLS: 41%
 STRUCK BY/AGAINST: 15%
 TRAFFIC ACCIDENT: 14%

ASSAULT: 11%
 OTHER: 15%

NEXT STEPS

STOP 1. Stop sport/activity when in doubt, sit it out

2. Seek medical evaluation

What should I do? For more information, visit: vestibular.org

Brainstem Contusion Injury

Orientation

Vestibular Nerve Injury Resulting from Sudden Forward Acceleration

Normal

Vestibular Nerve Injury

46

UNDERSTANDING VESTIBULAR INJURIES

- Patients will NOT present with a vestibular diagnosis
- You may be the only one who recognizes it
- The patient just lives with the symptoms



"House is burning down, but they're used to it"

- Vertigo
- Feeling Faint
- Unsteadiness
- Feeling as if the room is spinning
- Loss of balance (disequilibrium)
- Visual disturbances
- Lightheadedness
- Weakness
- Wooziness
- Fatigue
- Nausea

47

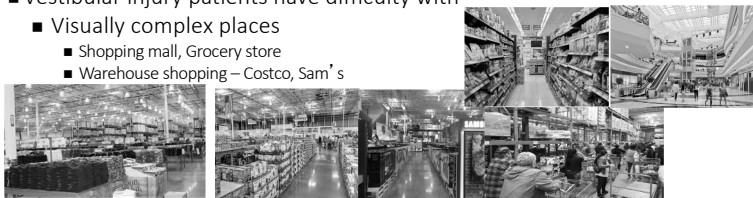
Why Vestibular Injuries are so Devastating

- "My location in space" is so important that the brain has three systems of input – the ear's vestibular system, the eyes and the mechanical receptors at C1-C2 and in the lower extremity joints.
- All of the input needs to correlate or the most primitive part of the brain has problems.
- When the vestibular system is injured the brain learns to ignore the ears and depend on the eyes and mechanical receptors for information about its location in space.
- And that's where the trouble starts

48

Symptoms from Vestibular Injuries

- Dependence on the eyes for balance creates problems when the eyes are processing complex visual information. No Horizon!
- Vestibular injury patients have difficulty with
 - Visually complex places
 - Shopping mall, Grocery store
 - Warehouse shopping – Costco, Sam's



- Symptoms may include memory loss, anxiety, discomfort, fatigue, dizziness, disequilibrium, nausea, or feeling of fullness in one or both ears
- Symptoms worse with reductions in air pressure, rainy days, altitude

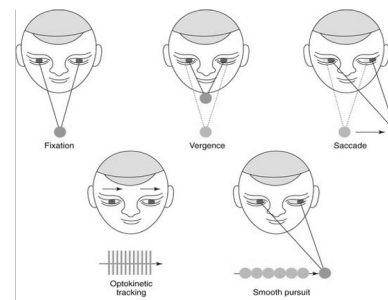
49

49

Symptoms from Vestibular Injuries

Saccadic pursuit

- Eyes bounce instead of smooth tracking
- Produces fatigue and intolerance of reading, computers or watching video screens

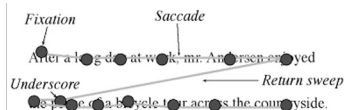


50

50

Symptoms from Vestibular Injuries

- The eyes should move smoothly. Instead they bounce
- This creates problems with moving visual information
 - Traffic
 - Computer work
 - Reading
- Symptoms may include memory loss, anxiety, discomfort, fatigue, dizziness, disequilibrium, nausea, or feeling of fullness in one or both ears
 - “Ever since the accident, I have trouble reading”, “Reading makes me tired”
 - This may be your only hint
- Symptoms worse with reductions in air pressure
- Months or years of vestibular rehab may “fix” the saccades, but may not “fix” the vestibular injury.



51

51

Symptoms from Vestibular Injuries

- Anxiety or “panic attacks”
 - The patient will often have been diagnosed as having “panic attacks”.
- Ask, “Exactly when and where do you have panic attacks?”.
- If the “panic” attacks only occur in visually complex situations or during sleep, a vestibular injury is most likely cause



52

52

Panic Attacks During Sleep

- Vestibular injuries cause panic during sleep because
- During sleep you are deprived of visual and mechanical clues for position
 - Proprioceptors not gravity loaded
- During sleep the brain has only the ears for information about position when the head moves
- If information from one ear conflicts with position information from the other ear,
- The brain notifies the RF and sympathetic nervous system that “We are falling through space – HELP!”
- The patient wakes with pounding heart and sweaty palms or a “panic attack”.

Sleep in one position for 60-90 minutes



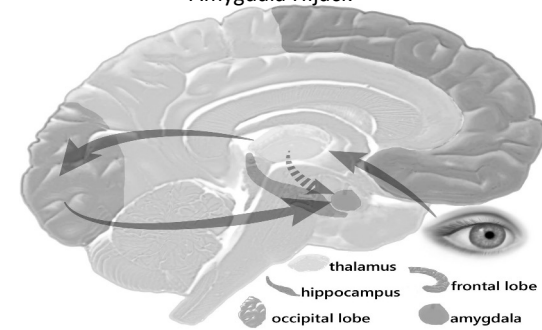
When you move, inner ears disagree, And the primitive brain panics



53

The Eye–Amygdala-Occipital lobe Cerebellum - Cortex

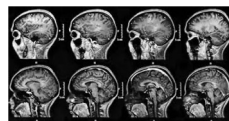
Amygdala Hijack



54

Symptoms from Vestibular Injuries

- Cognitive function, memory and sequencing depend on the movement of information from short term to intermediate and long term memory
 - Vestibular injuries inhibit the movement of information from short to long term memory
 - The brain is a large relational data base and “where am I in space” is the card catalogue
- Patients specifically have trouble with sequencing, memory for numbers and names
- Can be mistaken for “fibro fog”
- All of these symptoms will be worse on rainy days or at altitude



55

55

Vestibular History Questions

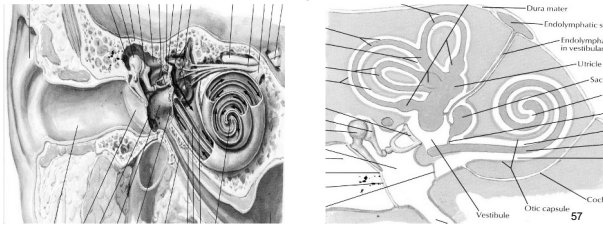
- Do you ever feel dizzy, nauseated or disoriented or have a sense of disequilibrium?
- Do you have difficulty with balance or coordination?
- Do you get anxious or uncomfortable in the mall, warehouse shopping, grocery store or other busy crowded places?
- Do you wake up frequently during the night?
- Do you have “panic attacks” during the night or while driving?
- Do you have difficulty with memory or sequencing?
- Do you “lose” or forget events or portions of days?

56

56

Vestibular History Questions

- ☑ Do you have a feeling of fullness in one or both ears?
- ☑ Are any of these symptoms worse when it rains or when the air pressure changes?
- ☑ Do sounds and noises seem louder than they used to?
- ☑ Do sounds and noises bother you more than they used to?
- ☑ Can you hear your eyes blink?
- ☑ Do you have trouble concentrating when there is noise or motion around you?



57

Vestibular Diagnosis

- Endolymphatic Hydrops or Fistula
- Meniere's
- Inner ear Concussion
- Otolith displacement (Epley maneuver effective)
 - Check for upper cervical ligament stability before attempting
 - Rule out Ehler's-Danlos prior to Epley Maneuver - Evaluate Beighton Score <7/9
- Centrally mediated brain vestibular injury
- Semicircular Canal Dehiscence

58

58

Vestibular Screening Exam

- Fields of Horizontal and Vertical Gaze: The eyes should track smoothly. Horizontal gaze return will show saccadic pursuit (nystagmus) when vestibular injuries are present.
- Weber's, or modified Weber's: Place a 128 tuning fork on the top of the head or at the center of the forehead. The patient should hear the sound equally in both ears. If there is an inner ear injury the sound will lateralize.
- Place tuning fork on lateral malleolus. If dehiscence, patient will hear tuning fo
- Air Conduction: If the 8th nerve is damaged sound will be aversive on one or both sides. This is not Rinne's test – determines only whether sound is bothersome
- Balance on one foot – eyes open/closed: if balance depends on visual cues patient cannot balance with eyes closed

59

59

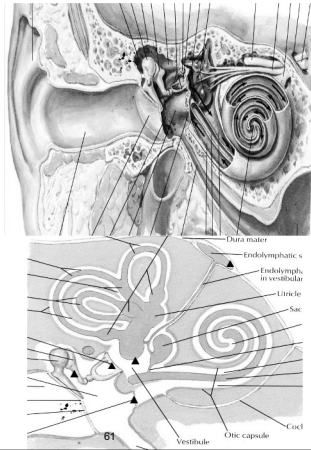
Vestibular Testing

- BIVSS (18, 28) – Brain Injury Vestibular System Symptom Questionnaire
- Vestibular testing lab
 - Audiologist
 - Most large metropolitan hospitals
- Need testing, expert referral to confirm diagnosis
 - Platform testing
 - ECOG
- Find the expert by asking the lab for doctors who order tests and are good with patients

60

Vestibular Injuries

- Endolymphatic – Hydrops, Fistula
 - Semicircular canals are enclosed in the endolymphatic sac
 - Normally it is a closed system
 - When the sac, or the oval or round windows are torn, area is open to outside air pressure and leaks fluid. See ▲
 - Feeling of fullness in ear
 - Changes in air pressure change vestibular input
 - Rainy days
 - Elevators
 - Altitude – mountains, airplanes
- Brain injury – Vestibular Center
- Cervicogenic Vestibular Injury – C1-2
- Eighth Nerve Damage
 - Traction injury, Compression damage, Changes hearing and vestibular function



61

Care of Vestibular Injury Patients

- This condition cannot be cured
- Testing helps demonstrate injury objectively
 - But doesn't usually change therapy
- It can be managed once diagnosed
- Patients benefit from having a diagnosis and knowing they're not crazy.
- The diagnosis can prevent suicides



62

62

Care of Vestibular Injury Patients

- Neuro-optometry – prism lenses correct visual input – FCOVD optometrist – improves balance. Not all FCOVD optometrists are created equal.
- Vestibular rehab can help but not all programs are equally effective
 - Prism glasses for 6 months before vestibular rehab
- Medication can help
 - Meclizine - 2 at night, one in AM standard dose – up to 6/day
 - Valium – more effective but addictive, rarely prescribed
 - SSRI's NOT useful
- Vestibular support – vestibular.org – VEDA
- Sleep with a light on
- Sleep with pillows for proprioception
- Find or create a horizon with furniture, pictures, window

63

Depression

64

They all look the same
when they arrive in your office

The progression of symptoms is the same no matter what caused it.
To CURE Fibromyalgia you have to address what caused it.
The symptoms will all be the same.
Treating the cause will lead to the cure



69

Treating Fibromyalgia



70

The most important thing you
need to know about Fibromyalgia
is that it is curable

Not in every case, but it is curable
often enough that a cure should
be the intention of treatment

For complete information see Fibromyalgia Workshop
FrequencySpecific.com

71

Progression of Fibro Symptoms

- In Fibromyalgia from Spine Trauma, PAIN generalizes in one to three months after spine trauma – whiplash, MVA, lifting, childbirth
 - Characteristic of deafferentation injuries
- Food sensitivities – macrophages release histamine
 - Stimulate class C pain fibers – causes PAIN – disturbs sleep
- Organic Chemical exposure leads to body PAIN, sleep disturbance, endocrine dysfunction
- Chronic Stress thins gut wall, leads to food sensitivities, PAIN, sleep disturbance.
- Vitamin D deficiency causes body pain, depression, sleep disturbance

72

72

Progression of Fibro Symptoms

- Stress response to PAIN is the same – no matter the cause
- Sympathetic and adrenal upregulation – Elevates brain CRF / CRH
- Increases Cortisol
- ↑ Cortisol leads to thinning of the gut wall
 - Reduces branch chain amino acids – Tryptophane, Tyrosine, Leucine, Phenylalanine
 - Reduces serotonin, Thyroid receptors, dopamine
 - Leaky gut → food allergies (IgE), sensitivities (IgG)
- CRF and cortisol cause changes in digestive function
 - Reduce vagal tone
 - Decrease in stomach acid and enzymes → reflux and food rotting → IBS
 - Change in GI Ph leads to changes in bacterial flora → IBS, SIBO, Candida

73

73

Progression of Fibro Symptoms

- Alterations in cognitive function - CRF acts as neurotransmitter
 - Impaired processing and short term memory, selective long term memory
 - Once CRF goes up, they can't ever remember being well
- Central pain amplification
 - Thalamus changes from pain suppression to pain amplification
- Alterations in endocrine function
 - CRF decreases ↓ FSH, ↓ LH centrally → reduces progesterone
 - Causes estrogen dominance, fatigue and PMS like symptoms
 - Even in men

74

74

Progression of Fibro Symptoms

- CRF reduces ↓ GHRH centrally → reduces growth hormone centrally
 - Growth hormone mediates amino acid transport for daily muscle repair in adults
 - GH also impaired due to sleep disturbance – stage four missing
- CRF reduces ↓ TSH → prevents TSH from rising even though patient is functionally hypothyroid because
 - Cortisol reduces ↓ T4 / T3 conversion
- Alterations in immune system functions
 - No bacterial illness but allergic to everything



75

75

To Cure Fibromyalgia

Treat the Cause

The cause will always be in the history or the blood work

76

Fatigue is a Symptom

Not a condition
To Cure Fatigue
Look for the Cause
And
Treat the Cause