



THE INFLUENCE OF THE BRAIN - GUT AXIS FOLLOWING A TBI/CONCUSSION

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POWERFUL OBJECTIVES

- ▶ Understand the Critical connection of The Brain-Gut (Microbiome) Axis
- ▶ Evaluate the relationship between Intermittent Fasting and Neurological Benefits
- ▶ Food and lifestyle decisions that impact specific parts of the brain
- ▶ Nutrition and Supplementation to Support Brain-Gut Axis

BRAIN AND THE NERVOUS SYSTEM

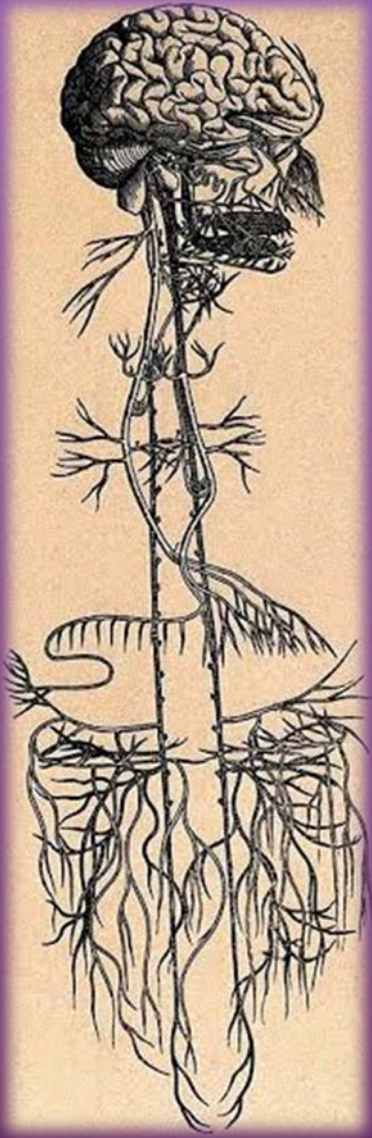
“ The Nervous System actually started out in the gut” says Emeran Mayer, Director of the UCLA Center for Neuro-visceral Sciences and Woman’s Health and UCLA Center for Neurobiology of Stress

Naturally try hard to protect the brain in our skull but what about our second brain?

BRAIN – GUT AXIS (GBA)

- ▶ Bidirectional communication between the central and the enteric nervous system, linking emotional and cognitive centers of the brain with peripheral intestinal functions.
- ▶ This interaction signals from gut-microbiota to brain and from brain to gut – microbiota by means of neural, endocrine, immune and hormonal links.

Annals of Gastroenterology: Quarterly Publication of the Hellenic Society of Gastroenterology. 2016; 29(2):240.



BRAIN - GUT AXIS VAGUS NERVE


- In order for normal and proper digestive system function, the brain must process the orientation of the intestines and recognize stimuli such as pH, distention, ischemia, inflammation and muscle contraction.

DR. DAVID PERLMUTTER

- ▶ “ Your brain is not “programmed” to shrink and fail as a matter of course as you age. We now know that every activity in which we engage be it exercise, the foods you eat, the supplements you take, your personal relationships, your emotional state, your sleep patterns – all of these factors dramatically influence your genetic expression from moment to moment. And this in turn, influences your overall health and risk of disease. ”

RESEARCH BEHIND NUTRITION AND BRAIN HEALTH

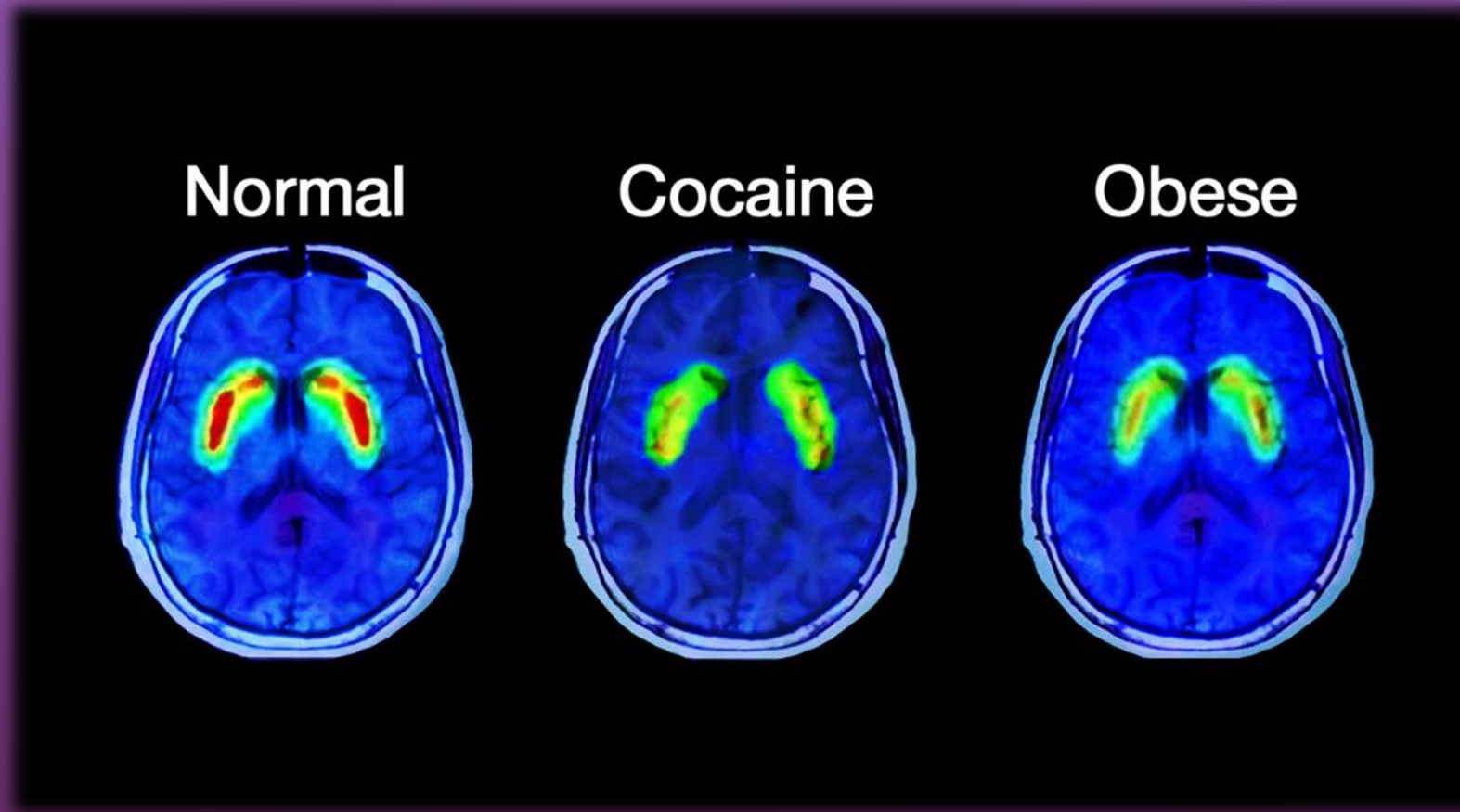
- ▶ A recent study by the European Brain Council and European College of Neuropsychopharmacology indicated that 38.2% of the European Union population, or 168 million people, suffer from a mental disorder.
- ▶ Estimated to cost €798 billion in 2010,
- ▶ More than cancer, cardiovascular disease, and diabetes put together
 - ▶ Stephane V. Sizonenko, Claudio Babilon, John W. Sijben, and Kristine B. Walhovd: Adv Nutrition. 2013 Sep; 4(5): 554–556

- ▶ Many studies suggest that nutrition can play a role in improving brain function throughout the life span.
 - ▶ However, progress in this field is challenged by methodologic and practical constraints, including the feasibility of conducting intervention studies with a long duration and the collection of data regarding mechanisms of action in humans.
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ORGANS AND TIME OF DAY

- ▶ Liver: 1am-3am
- ▶ Lungs: 3am-5am
- ▶ Large intestine: (or colon) 5am-7am
- ▶ Stomach: 7am-9am
- ▶ Spleen: 9am-11am
- ▶ Heart: 11am-1pm
- ▶ Small Intestines: 1pm-3pm
- ▶ Bladder: 3pm-5pm
- ▶ Kidneys: 5pm-7pm
- ▶ Pancreas: 7pm-9pm
- ▶ Blood Vessels and Arteries: 9pm-11pm
- ▶ Gallbladder: 11pm -1am

BRAIN – GUT CONNECTION AS CLEAR AS POSSIBLE



MEDICAL DEFINITION OF FASTING

- ▶ Voluntarily not eating food for varying lengths of time.
- ▶ Used as a medical therapy for many conditions.
- ▶ A spiritual practice in many religions.
- ▶ Preventative measure to increase overall health, vitality, and resistance to disease.

PURPOSE OF FASTING

- ▶ Fasting appropriate for nearly every chronic condition, including allergies, anxiety, arthritis, asthma, depression, diabetes, headaches, heart disease, high cholesterol, low blood sugar, digestive disorders, mental illness, and obesity.
- ▶ Detoxification for conditions influenced by environmental factors such as cancer and multiple chemical sensitivity.

COMMON FASTING OPTIONS

- ▶ 12 Hours
- ▶ 16/8 Hours
- ▶ 18/6 Hours
- ▶ 24 hour Fast (1x/week) (1x/month)
- ▶ 2-3 Day Fast (Physician followed)
- ▶ 5 day Fast (Physician Followed)
- ▶ Dry Fast (Physician followed, no water or showering)





Benefits of **Intermittent Fasting**

- ✓ Helps to Heal Your Gut
- ✓ Reduces Inflammation
- ✓ Improves Hormone Sensitivity
- ✓ Increases Growth Hormone
- ✓ You Become a Fat Burner

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SUPERCHARGE YOUR HEALTH

- ▶ Many of us already to do this
- ▶ Dinner to Morning
- ▶ BREAKFAST (Knowledge in the word)
- ▶ Must break the fast with 20-30 oz of water with lemon
- ▶ Fasting is like a muscle – it will take some time to gain the strength
- ▶ Uncomfortable symptoms at first

12 HOUR



16-18 HOURS FAST

- ▶ Chose the meal that is easiest to hydrate through for your schedule
- ▶ Forces you to drink lots of water and some herbal tea
- ▶ Under 50 calories and you are okay = take your medication
- ▶ Pink Himalayan salt will reset cravings during fast – add to water
- ▶ Eating Window 6 or 8 hours long
- ▶ Clean Food. Lots of Hydration.
- ▶ Management of stressful events is critical
- ▶ Adrenal Fatigue = body not ready for a fast
- ▶ First foods after a fast should be clean, healthy, vegetables, fruits and light on the red meat and dairy.

SCIENCE BEHIND TBI AND FASTING

- ▶ Fasting is Neuroprotective Following Traumatic Brain Injury
- ▶ Controlled Cortical Impact injury model to induce moderate – severe TBI adult male Sprague Dawley rats
- ▶ Tissue sparing assessments used to determine neuroprotective fasting
- ▶ Insulin or Ketone
- ▶ Mitochondria Function at the site of the injury

Davis, LM, Pauly JR., Readnower RD, Rho JM and Sullivan PG: J Neuro science Research 2008

RESULTS: FASTING & TBI

- ▶ 24 HR Fast shows CCI (Controlled Cortical Impact) resulted in significant tissue sparing:
 - ▶ Decreased oxidative stress, calcium loading
 - ▶ Increased mitochondrial oxidative phosphorylation
 - ▶ Neuroprotective maintains cognitive function, improves mitochondrial function

Underlying mechanism appears to involve ketosis rather than hypoglycemia.

SCIENCE BEHIND TBI & FASTING

- ▶ Chronic Intermittent Fasting Improves Cognitive Functions and Brain Structures in Mice
- ▶ Intermittent Fasting (alternate-day) or high fat diet (45% caloric intake was fat)
- ▶ 11 months
- ▶ Mice on Intermittent Fasting compared to regular diets (control mice) had better learning and memory
 - ▶ Thicker CA1 Pyramidal cell layer
 - ▶ Higher expression of drebin (a dendritic protein)
 - ▶ Lower oxidative stress

- ▶ Liaoliao Li, Zhi Wang, and Zhiyi Zuo. Chronic Intermittent Fasting Improves Cognitive Functions and Brain Structures in Mice. PLoS One. 2013; 8(6): e66069. Published online 2013 June 3. doi: 10.1371/journal.pone.0066069.

INTERMITTENT FASTING AND BRAIN FUNCTION IN MICE CONT.

- ▶ Mice fed with high fat diet was obese with hyperlipidemia and poorer exercise tolerance
 - ▶ However, they didn't present significant learning and memory impairment or changes in brain structure and oxidative stress compared to the control mice on the regular diet
 - ▶ Intermittent Fasting is beneficial to the brain function and structure in older adult mice
 - ▶ High fat diets does not cause changes in the structure of the brain
 - ▶ Control Mice with the regular diets had the least amount of positive outcomes in brain structure and function.
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- ▶ Liaoliao Li, Zhi Wang, and Zhiyi Zuo. Chronic Intermittent Fasting Improves Cognitive Functions and Brain Structures in Mice. PLoS One.2013; 8(6): e66069. Published online 2013 June 3. doi: 10.1371/journal.pone.0066069.

TOP TIPS FOR SUCCESSFUL FASTING

- ▶ Drink lots of clean Water = base template
 - ▶ Must SLEEP (10pm-2am)
 - ▶ Regular Sunshine = Melatonin and Vitamin D
 - ▶ Eat REAL FOOD
 - ▶ Good Emotional Relationships
 - ▶ Start slow and progress as YOUR body will allow
 - ▶ Can be used as a routine or as needed
 - ▶ If life is stressful and adrenal fatigue is possible = fasting should not happen
 - ▶ Continue to take all supplements and medications
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- ▶ Peter Osborne MD; Fasting Summit; Fasting and Inflammation 2019

NEUROTOXINS AND BRAIN HEALTH

BISPHENOL A (BPA)

- ▶ BPA is a chemical that's commonly found in plastic containers, bottled water and the coating of most food and drink cans.
- ▶ BPA can leak out of the containers and into foods.
- ▶ Once BPA enters the body, it can mimic the effects of estrogen which can disrupt normal hormonal function.
- ▶ Hormone Function GREATLY Affects the BRAIN'S ability.



NEUROTOXIN AND BRAIN HEALTH

ASPARTAME

- ▶ A common artificial sweetener (also known as high-intensity sweetener) that can be found in diet sodas and processed foods.
- ▶ This particular sweetener is created from the fecal matter of genetically modified bacteria.
- ▶ PAUSE = Think about that definition
- ▶ **The methanol in aspartame affects the dopamine system of the brain causing addiction. Methanol, or wood alcohol, is classified as a severe metabolic poison. (we live or die metabolically)**

Methanol is a schedule II Narcotic

- ▶ When aspartame is consumed = broken down by the enzymes in the digestive system =
 1. two amino acids
 2. type of alcohol called methanol.
- ▶ high abuse potential (effects dopamine levels in the brain)
- ▶ severe psychological and/or physical dependence liability.
- ▶ Examples of schedule II substances include narcotics, amphetamines, and barbiturates.
- ▶ Prescriptions for schedule II substances can never be ordered with refills and must be filled within 7 days of the date originally written.
- ▶ J.D.Heyes, May 31, 2016: Natural News: Aspartame is a Hidden Schedule II Narcotic

NEUROTOXIN AND BRAIN HEALTH = SUCRALOSE

- ▶ Sucralose is a sugar that has bonded with chlorine and contains 2 single sugars = 1. Glucose and 2. Fructose
- ▶ Scary = labs = converted to fructo-galactose molecule
- ▶ Does not occur in nature
- ▶ Body can't process or metabolize it properly = toxic brain
- ▶ It was accidentally discovered during a research program aimed at creating a new insecticide.
- ▶ When the body breaks sucralose down, it releases toxic chemicals.



<https://articles.mercola.com/sites/articles/archive/2000/12/03/sucralose-dangers.aspx>

INJURY TO DIFFERENT AREAS OF THE BRAIN

NUTRITIONAL DIFFERENCES

Frontal/Pre Frontal Cortex

- High intense Aerobic Exercise
- Shorter in duration
- 3-4 times/ week
- High Protein

Ant. Cingulate Gyrus

- High intense Aerobic Exercise
- Shorter in duration
- 3-4 times/week
- Low Protein
- Complex Carbohydrates

Basal Ganglia

- NO HIGH INTENSE EXERCISE
- Yoga
- Stretching
- Walking
- Focus = relaxation
- Greatly limit caffeine, alcohol and sugar

**KNOW
YOUR
GUT**™

**95% of your serotonin
is located within the
gastrointestinal tract***

**This is why people feel strong
emotions in their gut as well as their
minds. Follow your gut feeling!**

* Kim, D., (2000) Serotonin: A mediator of the Brain-Gut Connection'
The American Journal of Gastroenterology, 95(10)

BIO
essentials
international

BIO-E WORLD

COMPLEX CARBS = BINDS TO TRYPTOPHAN BINDS ALBUMIN = INSULIN UNAFFECTED

- ▶ Barley
- ▶ Beans
- ▶ Butternut squash
- ▶ Brown rice
- ▶ Carrots
- ▶ Lentils

- ▶ Oats
- ▶ Peas
- ▶ Pumpkin
- ▶ Quinoa
- ▶ Whole grains
- ▶ Yams

- ▶ Dairy = must be noted as a possible red flag (brain issues)
- ▶ Highly inflammatory and extremely hard on the kidneys, skin, entire detoxification
- ▶ In the body has a cross reaction and same as gluten
- ▶ Cottage cheese with steak, bacon wrapped cheese stick

PROTEIN - DAIRY



WHEAT



- ▶ Modern whole wheat, wheat bread, wheat pasta, wheat in pretzels, wheat in soups, sauces and casseroles
- ▶ Feed all the inflammation in the gut/ rot the garbage disposal pipes and create an entire cascade of inflammation from the brain – gut

Book: The Grain Brain By: Dr. David Perlmutter

INFLAMMATORY FOODS



If you feel exhausted after any meal, it is not the right food for your body regardless of how healthy the food is suppose to be.

- ▶ Spinach
- ▶ Kale
- ▶ Olives
- ▶ Nut Butters
- ▶ Nuts
- ▶ Eggs
- ▶ Strawberries
- ▶ Beets
- ▶ Beans

SUGAR

- ▶ Sugar steals the body of nutrients and vitamins
- ▶ Steals the body of energy
- ▶ Digestion gets all energy = no time for healing the body
- ▶ Evaluate mineral and vitamins = brand, dose, timing/day
- ▶ Endocrine system = hormones = shift after a TBI
- ▶ Hormone Cortisol if out of balance will crave sugar and alter Adrenal Glands



TBI = BRAIN HEALTH = SUPPLEMENTATION


- ▶ Natural Calm Magnesium
- ▶ Vitamin D3 = 10/-15,000IUS/Day Liquid only
- ▶ DHA/EPA = Omega 3 = Quality = 2,000mg/day
- ▶ Zinc = The low dosage is 5-10mg, while the high dosage is 25-45mg.
- ▶ GABA = Calm pathways of the brain = doses of up to 200 milligrams, four times a day, for a maximum daily dose of 800 milligrams.
- ▶ B12/Complex = Niacin B3, Folic Acid, B12 = powerful = Flushing
- ▶ CoQ10 and ALCAR = brain function
- ▶ Turmeric = turmeric extract or the compound, curcumin, (Liver caution) 400 to 600 mg of turmeric
- ▶ Extract three times per day = Dr. Andrew Weil

REFERENCES

- ▶ Annals of Gastroenterology: Quarterly Publication of the Hellenic Society of Gastroenterology. 2016; 29(2):240.
- ▶ Collins Dictionary of Medicine © Robert M. Youngson 2004, 2005
- ▶ Davis, LM, Pauly JR., Readnower RD, Rho JM and Sullivan PG: J Neuroscience Research. 2008 Jun;86(1812-22.doi:1002/jnr.21628
Fasting is Neuroprotective Following Traumatic Brain Injury
- ▶ <https://articles.mercola.com/sites/articles/archive/2000/12/03/sucralose-dangers.aspx>
- ▶ J.D.Heyes, May 31, 2016: Natural News: Aspartame is a Hidden Schedule II Narcotic
- ▶ Kim.D., The American Journal of Gastroenterology: 2000;95 (10). Serotonin: A Mediator of the Brain-Gut Connection.
- ▶ Liaoliao Li, Zhi Wang, and Zhiyi Zuo. PLoS One.2013; 8(6): e66069. Published online 2013 June 3. doi: 10.1371/journal.pone.0066069.
PMCID:PMC3670843
PMID:23755298
- ▶ Stephane V. Sizonenko, Claudio Babilon, John W. Sijben, and Kristine B. Walhovd: Adv Nutrition. 2013 Sep; 4(5): 554–556.
Published online 2013 Sep 5. doi: 10.3945/an.113.004283
PMCID: PMC3771147
PMID: 24038255
Brain Imaging and Human Nutrition: Which Measures to Use in Intervention Studies?

THANK YOU

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