

A dramatic sunset over a beach. The sun is low on the horizon, creating a bright glow that illuminates the clouds and the water. A vibrant rainbow arches across the sky from the left side towards the center. The foreground shows a dark, silhouetted beach with a single person standing near the water's edge. The overall mood is serene and contemplative.

The Low Glutamate Diet as a Treatment for Gulf War Illness

Dr. Kathleen Holton

Nutritional Neuroscience Lab

American University

Rationale

- Three of the major exposures from the GW (low-dose chemical agents, pesticides, and pyridostigmine bromide (PB) pills) cause downstream release of glutamate, leading to neurotoxicity
 - These also induce blood-brain barrier (BBB permeability)
 - Also caused by head trauma, infection, and significant stress
- The low glutamate diet has previously been shown to significantly reduce symptom load in FM (similar multisymptom profile)
 - Those w/ dietary glutamate sensitivity tend to have past exposures increasing the likelihood of BBB permeability
 - BBB permeability increases dietary glutamate's access to the brain
- Thus, we hypothesized potential similar benefits for veterans w/ GWI

Innovation

- To our knowledge, this is the *first dietary intervention shown to dramatically reduce the symptom burden in GWI*
- The diet is unique, in that it aims to concurrently reduce excitotoxicity, oxidative stress, and neuroinflammation in the brain
 - Healthy whole-food diet
 - Removes sources of free glutamate (mostly food additives)
 - Increases intake of nutrients known to protect against excitotoxicity
 - Increases intake of all dietary antioxidants and minerals necessary for antioxidant enzyme systems to function

Significance

- The effect size ($d=1.16$) was considered “very large”
 - **73% were considered improved** based on PGIC
- We observed *highly* significant improvements in every single measure after one month on the low glutamate diet
 - Included highly significant reductions in **overall symptom number** (avg of 9 symptoms remitted), **pain, fatigue**, measures of **depression, anxiety and PTSD**
 - Also saw significant improvements in **cognitive function, QOL, and BP**
 - **Systemic IL-1 β** was also significantly reduced, and overall reduction in the inflammatory cytokines *IL-1 β , IL-6, and TNF- α* accurately predicted improvement on the low glutamate diet in 76.5% of cases
 - IL-1 β and TNF- α can both increase glutamate release and decrease glutamate re-uptake leading to enhanced excitotoxicity

Considerations for Treatment Utility

- No FDA approval needed!
- **Low-cost** treatment option with no side effects plus other potential benefits for diet related conditions (BP, diabetes, heart disease, etc.)
- Dietary treatment could be rolled out to veterans via VA dietitians
 - Would require funding for training VA dietitians, creation of training materials, etc.
 - Could easily be piloted in a smaller number of VA facilities first



Discussion