

GULF WAR SYNDROME

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THE “GOOD NEWS”

- Only 47 days – Shortest war in U.S. history
- Fewer than 300 deaths and 400 wounded (only 147 combat deaths)
- Compared with estimated 100,000 Iraqi soldiers killed and 300,000 wounded
- Mass chemical and biological attacks did not occur

THE "BAD NEWS"

- Reports of frequent sounding of chemical alarms, dead animals
- Reports of strange, debilitating symptoms
- Beginning with reservists, then spreading to active duty, family members, then from Americans to other nationalities

RISK FACTORS FOR GWS SX.

- Chemical Warfare Agents
- Biological Warfare Agents
- Vaccines and Nerve Agent Antidotes
- Parasites and Bacteria
- Oil Well Fires
- Depleted Uranium
- Other Environmental Hazards (e.g., CARC Paint, Fumes from Fuel)
- Stress



CCEP Evaluation:

- ✓ Medical history / Gulf War Risk-Factor Questionnaire
- ✓ Physical examination
- ✓ Basic and additional lab tests
- ✓ Specialty consultations from neurology, infectious diseases, psychiatry, neuropsychology

GENERAL PRINCIPLES OF NEUROTOXIC DAMAGE

- Direct (Injury to Neurons)
- Indirect (Injury to Other Organs)
- Central NS vs. Peripheral NS
- Anoxia
- Selective Vulnerability of NS to Neurotoxic Damage
- Acute vs. Sub-Acute vs. Chronic Effects

Selective Vulnerability of NS to Neurotoxic Damage

- Neurons cannot regenerate
- Tendency of many neurotoxins to be lipophilic (“fat-loving”)
- Many neurotoxins cross blood-brain barrier
- Architecture of neurons expose surface area to neurotoxins
- Delicate electrochemical balance

Acute vs. Sub-Acute vs. Chronic Effects

- Acute exposures are usually quite noticeable in their effects
- Exposures in GW were mostly sub-acute (low agent exposure)
- Caveat: Multiple possible exposures
- Chronic low-level exposures can lead to “silent” neurotoxic syndromes – analogy of Parkinson’s Disease
- Difference between chemical and biological agents

Well-Recognized Human Developmental Neurotoxicants

- Ethanol
- Mercury
- Lead
- Dilantin
- PCB's
- PBB's
- Pesticides
- Ionizing Radiation
- Cadmium
- Anesthetics
- Cocaine
- Methadone
- Heroin

Challenges in Assessment of Neurotoxic Syndromes

- Exposure ambiguities
- Lack of neurochemical markers/
corroborating medical evidence
- Premorbid function
- Clinical vs. epidemiological
assessment
- Differential diagnosis
- Political/legal ramifications

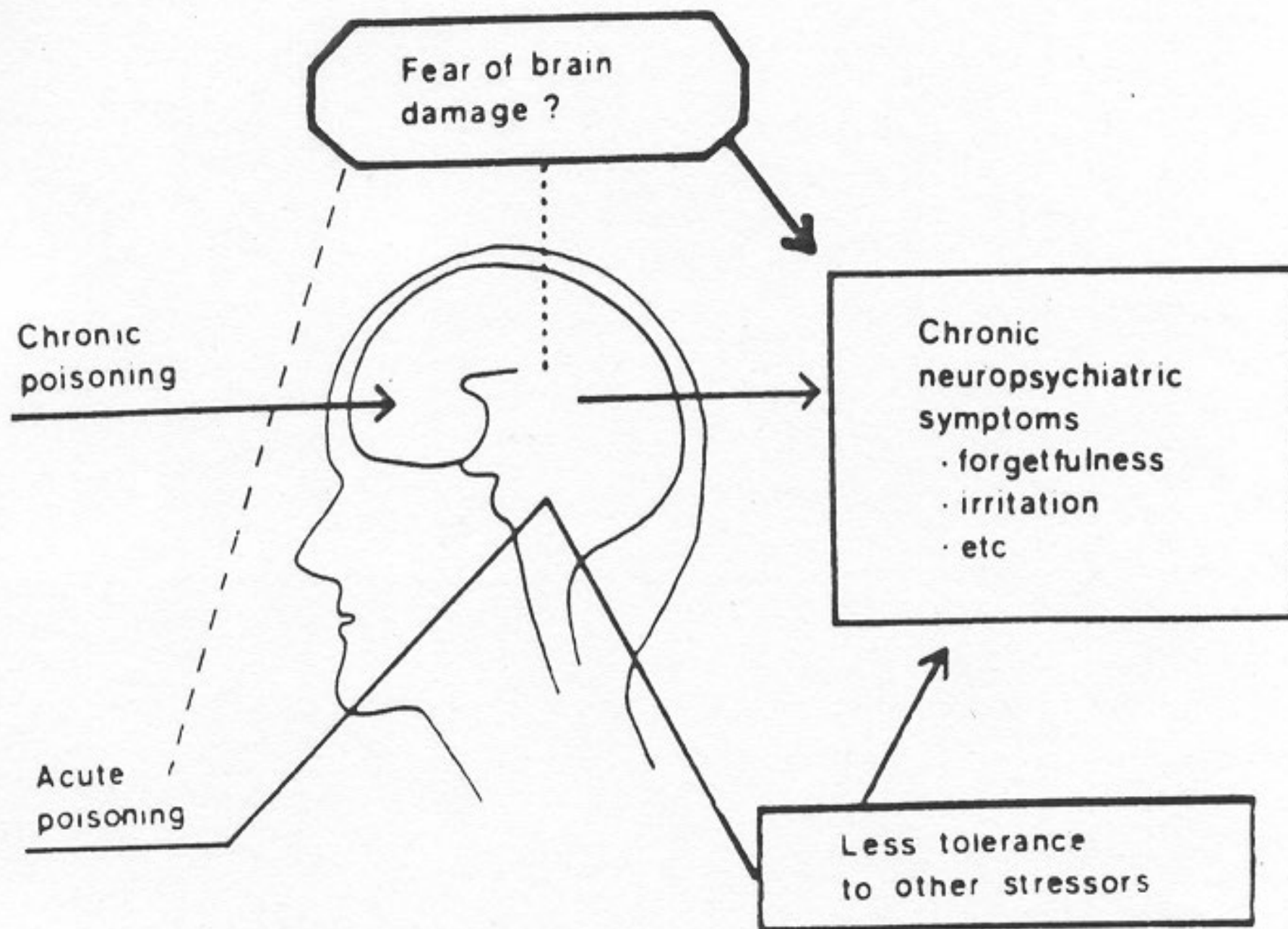


FIGURE 1.1. Differential diagnostic possibilities in neurotoxicity evaluations. (Reprinted, by permission of the publisher, from Hane, M., and Ekberg, K. (1984). Current research in behavioral toxicology. *Scandinavian Journal of Work Environment and Health*, Suppl. 1, 89.)

RESEARCH QUESTIONS – as compared with controls,

1. What was the prevalence of various psychophysiological stressors among Gulf War veterans?
2. What is the prevalence of neurological and neuropsychological deficits?
3. What is the prevalence of psychological symptoms and/or diagnoses?

Psychophysiological stressors?

The theater of operations was a hostile environment. The majority of GW veterans report high levels of stressful experiences during the war. In several studies, ill GW veterans consistently reported more combat stressors than healthy GWV, such as deaths among unit members.

TABLE 1.13. Common Neuropsychological Symptoms of Neurotoxicity

General intellectual impairments

Intelligence (IQ) (with more severe exposures)

Attention

Concentration

Abstract reasoning

Cognitive efficiency and flexibility

Global impairments (dementias)

Motor impairments

Fine motor speed

Fine motor coordination

Gross motor coordination

Gross motor strength

Sensory impairments

Visual disturbances

Auditory disturbances

Paresthesias/anesthesias

Tactile disturbances (PNS or CNS disorders)

Memory and learning impairments

Short-term memory (verbal and nonverbal information)

Learning (encoding of new information—verbal and nonverbal)

Long-term memory (verbal and nonverbal)

Visuospatial impairments

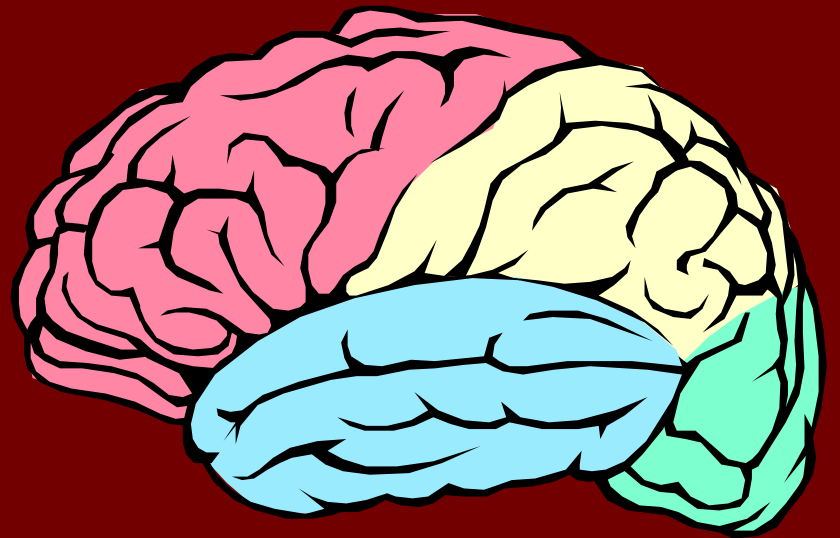
Constructional apraxias

Personality impairments

Anxiety, depression, delirium, organic brain syndrome, organic affective disorder, other psychotic disorders, anger, tension, fatigue, irritability, posttraumatic stress disorder, autonomic arousal

Haley et al. GW Syndromes:

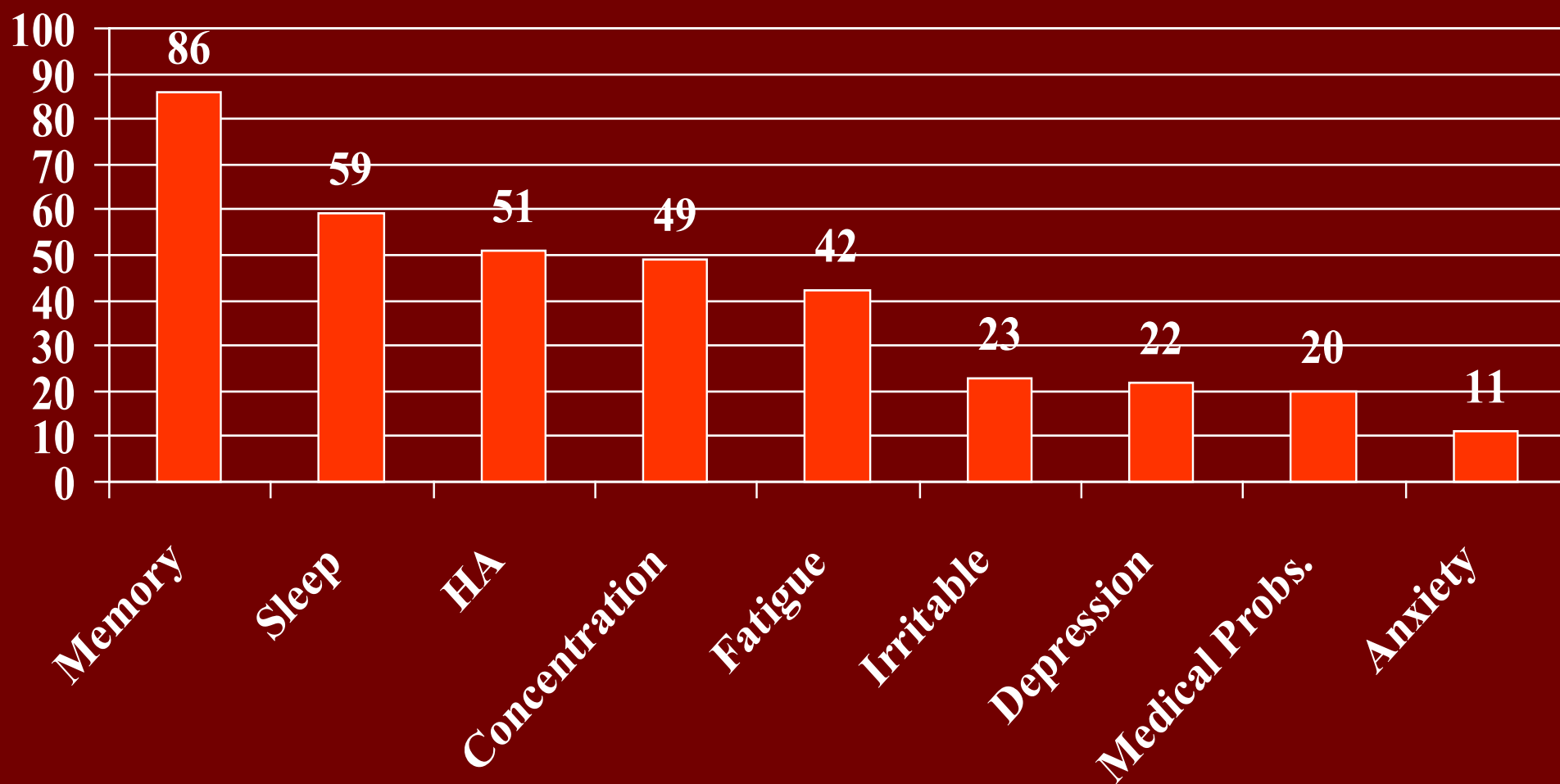
1. "Impaired Cognition"
 - Pesticide
containing
flea collars
2. "Confusion Ataxia"
 - PB tablets & nerve
gas
3. "Central Pain"
 - PB tablets & DEET



Garth Nicolson & Mycoplasma:

”Systemic chronic microorganism infections can cause chronic fatigue, reoccurring fevers, night sweats, joint and muscle pains, stomach upsets and cramps, diarrhea, breathing problems, sleep disturbances, sinus congestion/pain, headaches, skin rashes, kidney pain, dizziness, nausea, short term memory loss, vision problems, such as light sensitivity, blurred vision and floaters, hair loss, urination problems, eye pain, heart and thyroid problems and in extreme cases autoimmune-like disorders, such as those that lead to muscle degeneration and paralysis.”

MAMC GW Top Presenting Complaints (% of Pts. Reporting):



MAMC GW Neuropsych. Battery

- Shipley Institute of Living Scale
- Neurobehavioral Cognitive Status Exam
- Rey Auditory Verbal Learning Test
- Symbol Digit Modalities Test
- Trailmaking Test
- Fingertapping / Grooved Pegboard
- Personality Assessment Inventory

MAMC OVERALL TEST RESULTS

"Strengths":

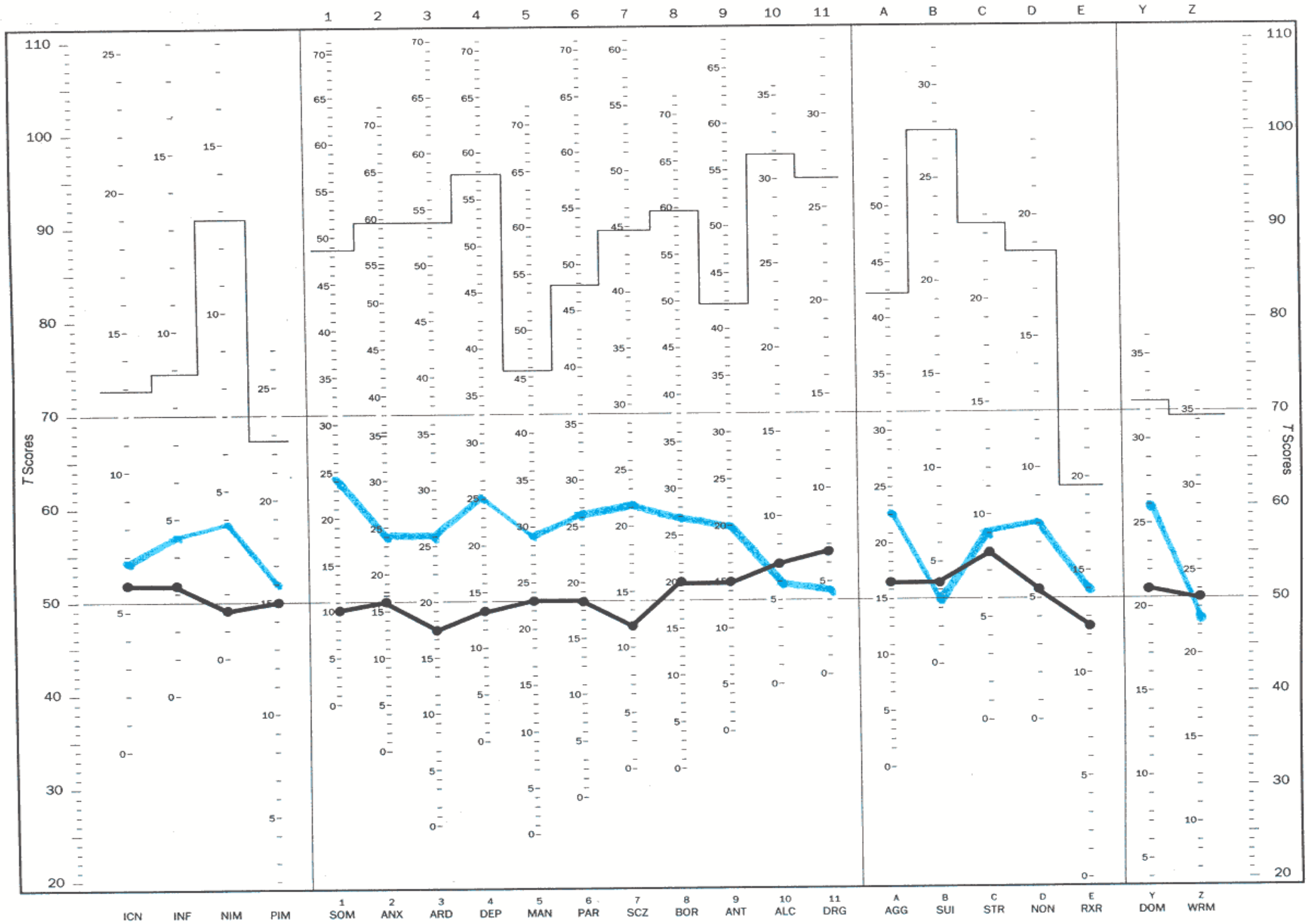
- Shipley IQ 104.6
- NCSE WNL
- Trails A + .2 SD
- Trails B Mean
- AVLT Tot. + .3 SD
- Tap/GPB Mean

"Weaknesses":

- SDMT Writ. - .5 SD
- SDMT Oral - .4 SD
- AVLT Intr. - 3.0 SD
- PAI + 1.0 SD

MAMC GULF WAR PTS. (N=94)

CLUSTER 1 PAI PROFILE



Neuropsychological deficits?

Self-reports of memory and concentration problems tend to be more frequent among deployed GW veterans than among control subjects. However, performance is similar on most objective neuropsychological tests. On a small proportion of tests, GW veterans perform significantly more poorly than controls. After adjustment for psychological distress, differences between the two groups usually diminish.

Neurological deficits?

Neurological studies to date with several populations show that most Gulf War veterans do not demonstrate gross objective evidence of neurological diseases, either in the CNS or PNS. However, several studies are in progress performing neuroimaging in GWV and NDV, including conventional MRI, functional MRI, magnetic resonance spectroscopy, and SPECT.

Psychological symptoms and/or diagnoses?

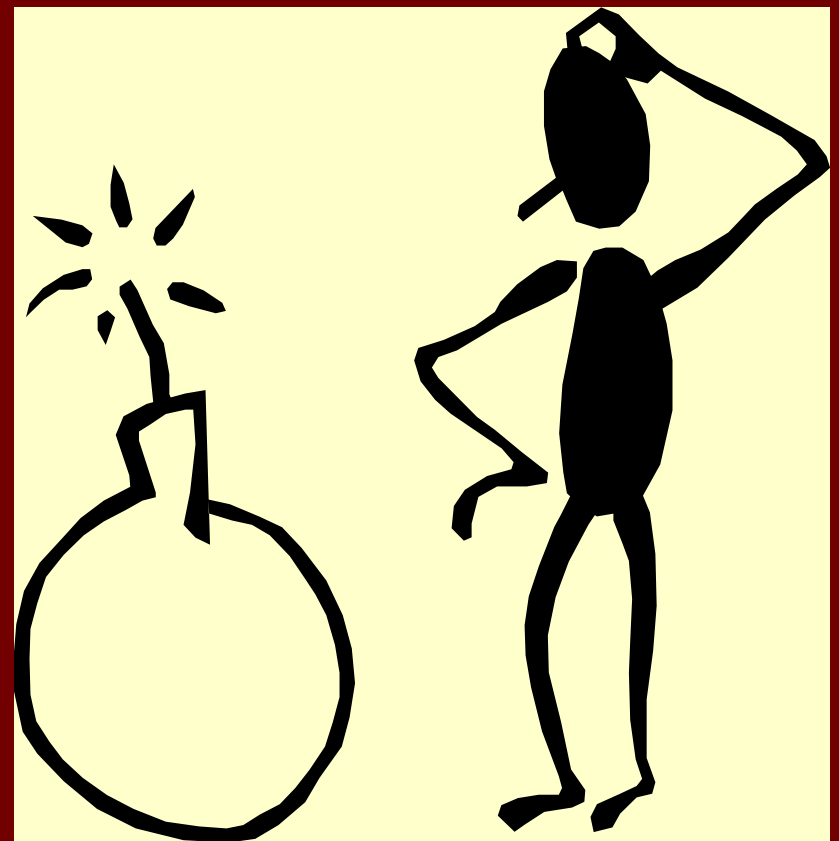
GW veterans have been diagnosed with significantly higher rates of posttraumatic stress disorder (PTSD) and major depression than non-deployed veterans. In two large cohorts, GW veterans diagnosed with PTSD or depression also reported physical symptoms in many organ systems at higher rates than non-deployed or healthy Gulf War veterans.

Subjective Appraisal of "Threat"

-- Perceived to be Higher

When:

- "Invisible"
- "Exotic" vs. Commonplace
- "Man-made" vs. "natural"
- Delayed effects
- "Unfair" --
(targets innocents)



OTHER THEORIES:

- ❑ Chronic Fatigue Syndrome
- ❑ Fibromyalgia
- ❑ Multiple Chemical Sensitivity
(Ecological Illness)
- ❑ Somatization Disorder

SOME CONCLUSIONS:

- A lot of GW vets and their families really are sick.
- Fog of War & and Fog of Science – we don't understand why (Unexplained Illness)
- Not one syndrome with one cause.
- Science is better than pseudoscience.
- Cause & effect is not the same as correlation.

CONCLUSIONS (Cont.)

- Clinical vs. epidemiological studies
- More study on long-term effects of low level exposures
- Some implicated chemicals are common in everyday life. If vets' chronic illnesses are the result of exposure to low levels of such chemicals, then all of us are at risk.
- Governments & media of a free society need to be more honest and responsible

Selected Websites:

- www.gulflink.osd.mil
Office of the Special Asst. for Gulf War Illnesses
- www.mod.uk/issues/gulfwar
UK Ministry of Defence Gulf War Site
- www.oversight.ncr.gov
Special Oversight Board for DOD
Investigations of GW Chemical & Biological Illnesses
- www.cdc.gov
Center for Disease Control
- www.gulfwarvets.com
American Gulf War Veterans Association