

The Havana Syndrome and Mass Sociogenic Illness

Review Article

Volume 5 Issue 2- 2024

Author Details

Seymour Solomon MD*

Professor Emeritus Department of Neurology, Albert Einstein College of Medicine, USA

*Corresponding author

Seymour Solomon MD, Professor Emeritus Department of Neurology, Albert Einstein College of Medicine Bronx, 42 Black Birch Lane, Scarsdale, NY 10583 USA

Article History

Received: June 11, 2024 Accepted: June 14, 2024 Published: June 14, 2024

Abstract

Background: In 2016, US personnel in Havana began to report a variety of unexplained neurological symptoms. The condition was termed the Havana syndrome. Three small studies led to the conclusion of brain injury in affected personnel. Two expert panels favored radiofrequency energy as the cause. But later studies did not support those conclusions.

Methods: Peer reviewed studies using the terms Havana syndrome, anomalous health incidents, and neurological symptoms with Havana were searched in Pub Med, Google Scholar and the US Federal Register.

Results: Although standard MRIs were normal, two small studies using diffusion-weighted MRI and related techniques showed differences in brain microstructures in affected personnel versus control groups. Another study of personnel who experienced auditory and vestibular symptoms were compared to a control group. The affected individuals were found to have abnormalities implicating the otolithic organs. These studies and the resemblance of symptoms to cerebral concussion lead to the judgment that affected personnel had suffered brain injury. Two expert panels concluded that a directed pulsed radiofrequency energy was the probable cause of the syndrome. Two later studies found no evidence of brain injury.

Conclusion: The Havana syndrome is not associated with brain injury. There is no evidence of an exotic energy affecting personnel. Functional neurological disorder affecting groups, i.e. mass sociogenic illness, is the most likely explanation of the Havana syndrome.

Keywords: Havana Syndrome, Anomalous Health Incidents, Brain Injury Functional Neurological Symptom Disorder

Abbreviations: DWI: Diffusion-Weighted Images, MSI: Mass Sociogenic Illness

Introduction

In 2016, American diplomatic personnel in Havana, Cuba began to report episodes of neurological symptoms. Later CIA officers and Canadian diplomats were affected. The initial symptoms were associated with sound, vibration or pressure phenomena; cognitive impairment was noted in some. Later, headache, auditory and vestibular symptoms were frequently reported [1]. The mysterious phenomena was popularly known as the Havana syndrome.

US Government Actions

By 2020 more than 200 American diplomatic personnel and CIA officers in many parts of the world had reported the peculiar episodes. To collect more information, the State Department and the CIA asked their employees to report symptoms that could be part of the Havana syndrome [2]. The next year Congress passed a law compensating affected personnel. Rules were established to provide financial support (\$145,475 to \$187,300) for those with brain injury [3]. In a short time, there were 1500 claims.

Evidence of Brain Injury?

There were only three peer reviewed studies in support of brain injury [4-6]. In studies of affected personnel conventional clinical neuroimaging with multimodal MRIs did not reveal injury [1]. But small studies using diffusion-weighted MRI (DWI) and related techniques showed differences in the Havana syndrome groups versus unaffected symptom free control groups. DWI and related procedures reveal submicroscopic microstructural features of white matter that are up to three times the order of magnitude smaller than typical voxel sizes [7].

Using DWI and associated techniques American and Canadian investigators studied people with the Havana syndrome [4-6]. In the **American study**, reported in 2019, 40 subjects who had been “exposed” and symptomatic were compared to 48 healthy controls [4]. The studies were carried out 4 to 403 days (mean 188 days) after exposure. Mean whole brain white matter volume was smaller in subjects than in controls. There were significant differences in cerebellar microstructures. There was no significant correlation between the imaging metrics and clinical findings. One finding of microstructural measurement was the opposite of that seen in traumatic brain injury [4]. In the **study of Canadian** diplomats,



reported in 2022, 16 people who had been exposed (lived in Havana) were compared to 8 individuals who had not been exposed and 40 other healthy controls [5]. (This study was an elaboration of part of a prior extensive evaluation of this cohort [8]. That study was not peer reviewed). Four of the 16 who lived in Havana had a history of headaches or migraine. The studies of white matter microstructures were carried out using DWI and associated techniques. In contrast to the control groups, the exposed subjects showed a reduction in fiber density of the white matter pathways in the fornix and the splenium. The degree of loss of fiber density correlated with the number of days in Havana. The loss of fiber density in the fornix and splenium was linked to headache, the most commonly reported symptom, and auditory symptoms. Microstructural changes in cerebellar white matter noted in the American studies were not seen in the Canadian work. The results of the American and Canadian studies only rarely coincided. The **third study**, reported in 2019, involved personnel who had experienced sudden noise or ear pressure associated with ear pain and tinnitus as well as headache [6]. Twenty-five affected people were compared to ten controls, 4 and 60 days after exposure. By selection, dizziness and imbalance were the most common symptoms. The examinations included eye movement testing as well as specialized tests of vestibular and auditory function. All subjects who complained of dizziness/imbalance had abnormalities on qualitative vestibular examinations implicating the otolithic organs. Central vestibular tests were abnormal in 9 of 25 affected individuals.

It is reasonable to believe that the submicroscopic microstructural changes in the American and Canadian studies, and the changes reported in the otolithic studies are the physiological responses to symptoms rather than the cause of the symptoms or clinical injury. This concept is supported by the finding of DWI changes in brain microstructure in people with chronic back pain in contrast to a control group [9]. Evaluation by DWI and associated techniques of otherwise healthy headache sufferers would help to differentiate consequence from cause. In this regard, using these techniques, white matter changes have been reported in people with migraine [10]. The main limitations of these studies are the small numbers of participants and the heterogeneity of the symptoms. In any case the findings in the few small studies of affected personnel and the similarity of symptoms to cerebral concussion led to the clinical label of brain injury.

Caused by Radiofrequency Energy?

In 2020, the National Academies of Science, Engineering and Medicine concluded that a “directed pulsed radiofrequency energy” (especially microwaves) leading to brain injury was the most plausible explanation of the Havana syndrome [11]. In 2022, the government set up an expert panel to again study anomalous health incidents, i.e. the Havana syndrome [12]. The panel endorsed the concept of pulsed electromagnetic energy and added the belief that psychosocial factors could not account for the core characteristics of the incidents.

There are problems with the theory of pulsed radiofrequency energy as a cause of the Havana syndrome. The proposed energies, capable of causing damage, might well cause injury if applied directly to the head, but these energies progressively dissipate as the distance between the source and the target increases. Microwave energy exponentially decays with distance from its source. The energies would have to penetrate walls in hotel rooms, offices and homes of targeted personnel. On some occasions people in the same room did not experience the symptoms noted by the affected person. The episodes occurred outdoors as well as indoors and in friendly, as well as unfriendly countries. There were hundreds of “attacks” over many years, yet a device capable of causing injury was not detected. There is not a shred of evidence for the existence of such a fantastic device.

Mass Sociogenic Illness

If “directed pulsed radiofrequency energy” does not account for the

Havana syndrome, is there a more satisfactory explanation? Reports of episodes of bizarre behavior or a conglomeration of unexplainable symptoms affecting groups date back to the Middle Ages. The labels have been progressively less pejorative; from Salem witches to mass hysteria, to mass psychogenic illness, to Mass Sociogenic Illness (MSI). (Group sociogenic disorder would be an even more benign name). These terms have not been codified but the features of MSI are similar to the criteria for individuals with a conversion (functional) neurological symptom disorder as applied to a group. The criteria for a conversion/functional neurological symptom disorder, as listed in the Diagnostic and Statistical Manual of Mental Disorders, (slightly abbreviated) are:

- i. one or more symptoms of altered voluntary motor or sensory function,
- ii. incompatibility between the symptom and recognized neurological or medical conditions,
- iii. the symptom is not better explained by another medical or mental disorder,
- iv. the symptom causes distress or impairment of functioning [13].

A major feature of MSI is social contagion. The symptoms spread unconsciously from one to another in a group, and also may be transmitted to colleagues many miles away. Someone in an American consulate in China developed symptoms similar to colleagues in Cuba. Of course, in a group of hundreds of people some will have had an organic illness. Some of the symptoms may have been due to a bout of encephalitis. Other personnel may have had Meniere’s Disease (vertigo and hearing loss). But with a few exceptions, the symptoms of affected personnel were physiological, having neurological and psychological components. The symptoms are “real” not imagined, not faked. The headache in someone with MSI may be as intense as that caused by a brain tumor. So, it is understandable that people with MSI take umbrage with the notion of a psychological mechanism rather than an organic or structural disease. They, like many others, would rather have a diagnosis of brain injury than an illness with a psychogenic component. MSI is not limited to those who may be psychologically prone; no one is immune from this condition.

Functional neurological symptom disorder was thought to be purely psychological. It is now recognized as the interface of neurology and psychiatry. The symptoms are psychogenic but there are associated changes in brain physiology and microstructure. Using advanced neuroimaging techniques these changes have been extensively documented in affected subjects as compared to symptom free controls [14,15].

The Latest Government Assessments

After very comprehensive studies, the conclusions of seven United States intelligence agencies were summarized in 2023 by the CIA [16]. The ailments were not caused by a foreign adversary; a unique force was not found. There was no evidence of brain injury. The agencies concluded that pre-existing conditions, conventional illnesses and environmental factors were the probable cause of the Havana syndrome. Extensive studies were conducted by the National Institutes of Health (NIH) Clinical Center, reported in 2024, on personnel with anomalous health incidents (popularly known as the Havana syndrome) [17]. The tests showed no significant differences between affected personnel and control participants. Forty-one percent of participants “met the criteria for a functional neurological disorder and/or had significant somatic symptoms”.

Discussion and Conclusion

Diplomatic personnel in Havana, then in other countries, experienced a variety of unexplained neurological symptoms called the Havana syndrome. Although standard MRIs were normal, DWI



and related techniques showed changes in submicroscopic structures of the brain in affected subjects. These are likely the physiological response to the symptoms rather than their cause. Groups of experts concluded that a special form of directed energy (like microwaves) was the cause of the syndrome. But recent summaries of extensive studies by experts under the CIA and the NIH found no evidence of brain injury or of an exotic weapon generating harmful energy targeting diplomatic personnel [16,17]. Both the CIA and NIH groups exclude psychosomatic concepts or mass psychogenic illness from consideration. Ironically it is precisely those features that most reasonably explain the Havana syndrome. Symptoms and altered brain microstructure found in American and Canadian personnel were manifestations of a functional neurological disorder affecting groups. Though unappealing, mass sociogenic illness is the most tenable explanation for the Havana syndrome.

References

- Swanson RL, Hampton S, Green McKenzie J (2018) Neurological manifestations among U.S. government personnel reporting directional audible and sensory phenomena in Havana Cuba. *JAMA* 319: 1125-1133.
- Secretary of Defense (2021) Anomalous health incidents.
- Federal Register (2022) Implementation of Havana Act of 2021. Document # 2022-13887.
- Verma R, Swanson RL, Parker D (2019) Neuroimaging findings in U.S. government personnel with possible exposure to directional phenomena in Havana Cuba. *JAMA* 322(4): 336-347.
- Aristi G, Kamintsky L, Ross M (2022) Symptoms reported by Canadians posted in Havana are linked with reduced white matter fibre density. *Brain Commun* 4(2): fcac053.
- Hoffer ME, Levin BE, Snapp H (2019) Acute findings in an acquired neurosensory dysfunction. *Laryngoscope Investig Otolaryngol* 4(1): 124-131.
- Dhollander T, Clemete A, Singh M (2021) Fixel-based analysis of diffusion MRI: methods, applications, challenges and opportunities *Neuroimage* 118417.
- Friedman A, Calkin C, Adams A (2019) Havana syndrome among Canadian diplomats: brain imaging reveals neurotoxicity.
- Robertson JW, Aristi G, Hashmi JA (2023) White matter microstructure predicts measures of clinical symptoms in chronic back pain patients. *Neuroimage Clin* 37: 103309.
- Planchuelo-Gomez A, Garcia Azorin D, Guerreo AL (2020) White matter changes in chronic and episodic migraine: a diffusion tensor study. *J Headache Pain* 21(1): 1.
- National Academies of Sciences, Engineering and Medicine (2020) An assessment of illness in U.S. government employees and their families at overseas embassies. Washington, DC: The National Academies Press.
- Office of Director of National Intelligence (2022) Complementary efforts on anomalous health incidents. IC experts panel.
- Diagnostic criteria: conversion disorder (functional neurological symptom disorder) (2013). American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*. Arlington, VA. American Psychiatric Association 318.
- Begue I, Adams C, Stone J, Perez DL (2019) Structural alterations in functional neurological disorder and related conditions: A software and hardware problem? *Neuroimage Clin* 22: 101798.
- Perez DL, Nicholson TR, Asadi Pooya AA (2021) Neuroimaging in functional neurological disorder: state of the field and research agenda. *Neuroimage Clin* 30: 102623.
- National Intelligence Council (2023) Updated assessment of anomalous health incidents. Report # 2023-02286.
- Chen L, Hallet M, Zalewski CK (2024) Clinical, biomarker, and research tests among US personnel and their family members involved in anomalous health incidents. *JAMA* 331(13): 1109-1121.

