

Secretary of State Antony Blinken delivers remarks on Havana Syndrome, in Benjamin Franklin Room of State Department, in Washington, DC, November 5, 2021 (Reuters/Andrew Caballer0-Reynolds)



Havana Syndrome

Directed Attack or Cricket Noise?

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In late 2016, 21 American and Canadian diplomatic personnel stationed in Havana, Cuba, experi-

enced unusual and unexplained health problems. Although symptoms varied among those affected, the onset of illness was generally described as starting with hearing strange grating noises and feeling pressure in the ears coming from a specific direction and lasting less than 30 seconds. Other people nearby did not report any symptoms. Although most of those affected recovered with no residual symptoms, some had prolonged effects including hearing loss, memory loss, and nausea, and at least one individual now requires hearing

aids. The etiology of the illnesses was undetermined, but speculation at the time centered on the possibility that these health effects resulted from a directed attack by means of either sonic or radio frequency energy. While not accusing the Cuban government of intentionally causing these “attacks”—intentionality even today remains unproved—both the U.S. and Canadian governments reduced embassy staffing to essential personnel only.

The constellation of symptoms has been referred to as “Havana syndrome”

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because of the location of the original events, but subsequent attacks on U.S. personnel have been reported in locations around the world, including Austria, Australia, Colombia, Georgia, Kyrgyzstan, Poland, Russia, Serbia, Taiwan, and Uzbekistan. Also characterized as “anomalous health incidents” (AHI), at least two cases were identified in the United States—one involving a White House official while walking near her home in Northern Virginia, and one near the Ellipse in the District of Columbia, adjacent to the White House. Dozens more cases were reported among U.S. personnel in Vienna and Hungary in early 2021, and several cases were also reported in Vietnam, India, Germany, and in London. Hundreds more such events had been reported as of late 2022. After rigorous review, some of the reported illnesses were determined not to fit the defined criteria for this syndrome. Those cases remaining were almost exclusively among U.S. Central Intelligence Agency (CIA), Department of Defense (DOD), and Department of State personnel and their family members, some of whom have left government service due to health complications attributed to the syndrome.¹

Havana syndrome cases have been investigated by the CIA, the State Department Medical Branch, the National Institutes of Health (NIH), the Centers for Disease Control and Prevention (CDC), and DOD, among others.² For various reasons, there has been less than total information-sharing across the agencies involved. Physical health evaluations of those affected were performed at several locations and by means of different modalities, and there was little standardization across investigatory bodies.

Backstory: Once Upon a Time in Moscow

Microwaves were targeted against the U.S. Embassy in Moscow from 1953 until early 1976. Lilienfeld et al. conducted a biostatistical epidemiological study, published in 1978, which revealed that microwaves were directed at the upper half of the U.S. Embassy’s

Chancery Building from 1953 to 1975 at a dose of 5 $\mu\text{W}/\text{cm}^2$ for 9 hours a day. From June 1975 to February 1976, another area of the building received triple that dose (15 $\mu\text{W}/\text{cm}^2$) for 18 hours daily. More than 1,800 employees at this Embassy were exposed to these microwaves. Lilienfeld et al. compared these exposed employees to a comparison group of more than 2,500 employees at other Eastern European posts, including in Belgrade, Budapest, Leningrad, Prague, Sofia, Warsaw, and Zagreb. That study concluded that no notable difference in mortality was observed between these two groups.³ A subsequent analysis by Lilienfeld noted the difficulties of such prospective studies, including poor study participation and small sample size.⁴ More recent analysis has supported Lilienfeld’s initial conclusions, while acknowledging that others have offered alternative interpretations for the findings.⁵

A 1976 study (now declassified) of State Department employees who worked in the Moscow embassy compared their hematological test results with those of a similar group in Washington, DC.⁶ Differences between the two groups were noted for most blood cell components examined and were statistically significant, with important changes over time having occurred in the Moscow group. However, this information has never appeared in the peer-reviewed medical literature, and it is unknown if these two sets of samples taken in different locations were analyzed by the same or different laboratories or by means of the same standardized analytical methods.⁷

The International Agency for Research on Cancer (IARC) has since categorized radiofrequency electromagnetic fields as a possible carcinogen (Group 2B),⁸ and some have suggested that this designation is not restrictive enough.⁹ The cancer risks from such exposures may include gliomas, but the risk is unproved.¹⁰ Power densities measured at the Moscow embassy at that time were of the same order of magnitude as expected from living near a cellular device base station.¹¹

These incidents from 40 to 70 years ago with subsequent investigations

yielded overall inconclusive findings, just like the current incidents suspected of precipitating Havana syndrome. Experimental evidence at the time indicated that intense microwave doses could cause malignancies, neurological effects, and cataracts. Given the lack of evidence of increased cancer, neurological disorders, or loss of vision, Lilienfeld stated in 1978, “There is no convincing evidence to implicate the exposure of these people to microwave radiation and the onset of adverse health effects.”¹² Furthermore, the rise in white blood cell count found in the hematological tests and the subjects’ complaints of headaches, memory problems, and sleep loss were attributed to common infectious diseases and psychosomatic effects of the adverse publicity at the time. Lilienfeld recommended that “this recent group of 400 people” who had worked at the embassy during the period of most intense radiation “be followed and examined every two years for the next 10 years.” His recommendation does not appear to have been followed.

Havana Syndrome Defined

In 2017, the State Department requested that CDC evaluate all information related to the initial cases in Havana. In response, a team of experts reviewed available medical records of individuals who had been affected while in Cuba or shortly after departure and who were subsequently evaluated at the University of Pennsylvania Medical Center or the University of Miami. As part of its final report, CDC developed a case definition for this subset of the universe of persons affected.¹³

A presumptive case included any individual who had developed a biphasic constellation of symptoms, with at least one of the following symptoms appearing while in Cuba or within 2 weeks of leaving Cuba, with no other explanation: head pressure, disorientation, nausea, headache, vestibular (balance and coordination) disturbances, auditory symptoms, and vision changes; the second phase had to have occurred weeks to months after the original symptoms and included vestibular disturbances and/or cognitive

deficits (memory, concentration). A possible case included any individual who had developed one or more first-phase symptoms but had not subsequently developed second-phase symptoms.

An elite advisory group of science consultants advising the U.S. Government known as JASON was also contracted to determine the cause and nature of Havana syndrome.¹⁴ The JASON team concluded that the sounds recorded in Havana “are mechanical or biological in origin, rather than electronic. The most likely source is the Indies short-tailed cricket, *Anurogryllis celerinictus*.” Furthermore, “The recorded audio signal is, with high confidence, not produced by the nonlinear detection of high-power radiofrequency or ultrasound pulses. . . . We judge as highly unlikely the notion that pulsed RF [radio frequency] mimics acoustic signals in both the brain (via the Frey effect) and in electronics (through RF interference/pickup).” JASON therefore attributed 8 of the original 21 cases of the syndrome to hearing cricket noises.¹⁵ Needless to say, this explanation was not well received by some, particularly when those affected had chronic health outcomes because of their experiences.

The National Academies of Science, Engineering, and Medicine (NAS) was also commissioned by the State Department to review the cases, their clinical features and management, epidemiologic investigations, and the scientific evidence in support of possible causes. This review was challenging because of incompleteness of records or withholding of information because of national security issues. Nonetheless, the NAS committee developed a report. NAS agreed with CDC’s description of a biphasic course of illness.¹⁶ The most distinctive clinical aspects of the illnesses were the nature of the onset and the initial features: the sudden onset of a perceived loud sound, a sensation of intense pressure or vibration in the head, and pain in the ear or more diffusely in the head. Chronic symptoms, if present, suggested problems with vestibular processing and cognition as well as insomnia and headache. However, no consistent

picture of brain injury emerged from laboratory-based tests of vestibular function.

Although not performed on all personnel, complete physical and health evaluations including toxicology screenings, other blood tests, and neuroimaging studies (magnetic resonance imaging [MRI]) were performed on some personnel from the initial affected group with presumptive Havana syndrome.¹⁷ Specifically, MRI studies were performed at the University of Pennsylvania Medical Center on 40 personnel and the results were compared with those of a demographically similar control group.¹⁸ The studies identified no gross abnormalities or significant differences between the affected population and controls. Subsequent findings by the University of Pennsylvania team found that, compared with a healthy control group, the diplomatic personnel who had reported injury had experienced brain trauma. Advanced MRI scans (specifically, resting-state functional MRI, multimodal MRI, and diffusion MRI) revealed “differences in whole brain white matter volume, regional gray and white matter volume, cerebellar microstructural integrity, and functional connectivity in the auditory and visuospatial subnetworks but not in the executive control subnetwork” (executive brain functions are mental skills that include working memory, flexible thinking, and self-control). To add to this information, a study of 24 Canadian diplomats and their families affected by the syndrome documented brain white matter injury significantly correlated with clinical symptoms.¹⁹ Finally, a recently published prospective study of 45 U.S. diplomats injured during work assignment in Cuba found that their exposure resulted in prolonged illness with cognitive impairment and other clinical manifestations.²⁰

In summary, the preponderance of documented symptoms, diagnostic evaluations, and laboratory studies indicates that injuries were suffered by those complaining of symptoms described, and these injuries are most consistent with what might be seen with a persistent concussion, but without evidence of physical trauma.

Mechanism of Injury

The NAS committee also explored potential causes for the injuries described and test results. These potential causes included poisoning, especially with organophosphate or other insecticides; infectious agents, such as Zika virus; and psychosocial conditions. No medical condition like Havana syndrome has previously been described in the literature. There was no evidence of chemicals or infectious agents in environmental samples collected months after the incidence of illness and no evidence of previous psychological issues with any of those evaluated. However, it was considered that some of the complaints that accompanied the chronic issues plaguing those affected could have a psychological component.

Scientific literature notes an auditory effect of microwaves or ultrasonic energy, called the Frey effect. Beginning in 1961, with the original description by Frey, numerous articles have been published concerning the neural effect of microwave energy.²¹ The NAS committee concluded that directed pulsed RF energy (defined as 30 KHz to 300 GHz, including microwave radiation of 300 MHz to 300 GHz) appears to be the most plausible mechanism for Havana syndrome symptoms, especially in those with the distinct early manifestations. But the chronic symptoms reported in the affected individuals are the sort often seen in patients after head trauma or chemical exposure or because of infectious diseases or stress in a hostile environment. Finally, there is no documented evidence in the open-source literature of a weaponized RF emitter used against any affected individual, although it is understood that several countries, including Russia, have researched directed-energy weapons in recent years.²²

James Giordano, chief of the Neuroethics Studies Program at Georgetown University, stated that “the most likely culprit . . . would be some form of electromagnetic-pulse generation and/or hypersonic generation that would then utilize the architecture of the skull to . . . induce the constellation of signs and symptoms we’re seeing in these patients.”²³ Microwave energy in



Hotel Nacional, in Havana, Cuba (Courtesy nurzumspass)

the low-gigawatt range could evoke disruptions in neurological networks of the brain that could lead to functional disruption and durable impairment of cognition and behavior. Additionally, a laser component could be used for aiming or combined with electromagnetic or sonic energy to increase effectiveness against targeted individuals. Research in the use of directed energies for commercial and military applications has been conducted by Russia and China, and the United States has engaged in research on ranged acoustic, ultrasonic devices, and scalable microwave devices.²⁴

There is no accepted therapy to alleviate the symptoms of the Frey effect. One odd research paper indicates that a researcher self-medicated himself for purported symptoms caused by the Frey effect by use of the adrenergic vasoconstrictor naphazoline nitrate,²⁵ most used as a decongestant.²⁶ Another case study of a single Havana syndrome patient suggested that a 5-day multimodal program

of neurological exercises provided in 10 one-hour treatment sessions improved that patient's symptom severity score by >36 percent and their stability score by about 125 percent, but left stability "still severely compromised."²⁷

The Future?

On October 8, 2021, the Helping American Victims Afflicted by Neurological Attacks (HAVANA) Act was signed into law by President Joe Biden. Public Law 117-46 authorizes "payment to personnel of the Central Intelligence Agency who incur qualifying injuries to the brain [and] payment to personnel of the Department of State who incur similar injuries." As of August 2022, initial payments of up to \$187,300 have been authorized for those State Department employees affected by AHI/Havana syndrome.²⁸

Although this law admirably addresses potential compensation to U.S. Government personnel affected by

Havana syndrome, a definitive determination of the cause of this syndrome remains elusive 6 years after its first occurrence. As noted, cases have continued during recent years. Hostile governments have previously subjected American Embassy buildings to microwave radiation, demonstrating a willingness to subject U.S. personnel to surreptitious energy sources that may cause deleterious health effects. Until there is consensus as to the precise cause of and methods to prevent or treat Havana syndrome, it will likely remain an enigma and health concern for diplomatic, intelligence, and military personnel globally.

We have progressed considerably from attributing AHI/Havana syndrome to noises caused by indigenous crickets. Yet the problems of identifying its origin and possible perpetrator(s) remain unsolved. Until answers are found, it remains undetermined if foreign actors have developed an ingenious method for hampering our overseas diplomatic

missions, or if perhaps foreign postings in and of themselves contribute to the cause. Clarity on the cause of and treatments for the syndrome is now a U.S. Government priority. As Secretary of State Antony Blinken has stated, “We will get to the bottom of this, and meanwhile we will do everything we can to care for our people.”²⁹ JFQ

Notes

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