

Summary

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What Is Havana Syndrome?



What is Havana syndrome? Learn about the symptoms, potential causes, and treatment of this mysterious illness

Havana syndrome is a series of debilitating symptoms that first affected U.S. intelligence officers and embassy staffers stationed in Havana, Cuba, in late 2016. In the following year, American diplomats in different parts of the world reported similar symptoms.

Researchers investigating the condition have stated that Havana syndrome, which was initially dismissed as mass hysteria or a reaction caused by psychosomatic causes such as stress, may be a result of microwave weaponry. Symptoms are similar to those of a concussion or mild head injury and have mostly been reported by diplomats, intelligence officers, military personnel, and their family members deployed on foreign soil.

To date, Havana syndrome has affected more than 130 people, with a few officials having reported symptoms while they were on U.S. soil. Symptoms are not only distressing but aftereffects also seem to linger for a long time.

From <https://www.medicinenet.com/what_is_havana_syndrome/article.htm>

'Havana syndrome' and the mystery of the microwaves



Doctors, scientists, intelligence agents and government officials have all been trying to find out what causes "Havana syndrome" - a mysterious illness that has struck American diplomats and spies. Some call it an act of war, others wonder if it is some new and secret form of surveillance - and some people believe it could even be all in the mind. So who or what is responsible?

It often started with a sound, one that people struggled to describe. "Buzzing", "grinding metal", "piercing squeals", was the best they could manage.

One woman described a low hum and intense pressure in her skull; another felt a pulse of pain. Those who did not hear a sound, felt heat or pressure. But for those who heard the sound, covering their ears made no difference. Some of the people who experienced the syndrome were left with dizziness and fatigue for months.

Havana syndrome first emerged in Cuba in 2016. The first cases were CIA officers, which meant they were kept secret. But, eventually, word got out and anxiety spread. Twenty-six personnel and family members would report a wide variety of symptoms. There were whispers that some colleagues thought sufferers were crazy and it was "all in the mind".

Five years on, reports now number in the hundreds and, the BBC has been told, span every continent, leaving a real impact on the US's ability to operate overseas.

Uncovering the truth has now become a top US national security priority - one that an official has described as the most difficult intelligence challenge they have ever faced.

From <<https://www.bbc.com/news/world-58396698>>

Havana syndrome is a set of medical signs and symptoms reported by United States and Canadian embassy staff in Cuba dating to late 2016 as well as subsequently in some other countries, including the United States, Austria, and Germany. In 2021, the Biden administration started calling them "unexplained health incidents" or UHIs.

In 2018, U.S. diplomats in China reported problems similar to those reported in Cuba, as did undercover CIA agents working in other countries with partner agencies to counter Russian covert operations.

Studies of the affected diplomats in Cuba, published in the journal JAMA in 2018, found evidence that the diplomats experienced some form of brain injury, but did not determine the cause of the injuries. While there is no expert consensus on the cause, a co-author of the JAMA study considered microwave weapons "a main suspect". A National Academies of Sciences, Engineering, and Medicine expert committee concluded in December 2020 that microwave energy (specifically, directed pulsed RF energy) appears to be the most plausible mechanism in explaining these cases among those that the committee considered" but that "each possible cause remains speculative." In 2021, investigators were considering new evidence of directed microwaves, including blood markers from patients, which had recently been collected and analyzed more systematically.

The U.S. intelligence services have not reached a consensus or formal determination on the cause of the Havana syndrome, but unnamed sources in intelligence and two presidential administrations have expressed suspicions to the press that Russian military intelligence (GRU) is responsible

From <https://en.wikipedia.org/wiki/Havana_syndrome>

What is Havana Syndrome?

By Nicholas Davis * | July 28, 2021



In December 2016, diplomats and CIA officers at the US Embassy in Havana began to report mysterious symptoms. Dozens were suddenly and without warning falling ill with headaches, fatigue, hearing and vision loss, severe and debilitating cognitive impairment, tinnitus, brain fog, vertigo, and loss of motor control. Since then over 200 more diplomats, spies, DOD, and NSC personnel, from US embassies around the world and at home, have experienced some or all of this cluster of symptoms.

This mysterious malady is known as Havana Syndrome. Now numbering over 200 cases, Havana Syndrome is affecting US officials in Europe, Asia, Australia, and the Americas. Its effects are complex, painful, and inconsistent. Victims describe being bombarded by waves of pressure in their heads or hearing the noise of an immense swarm of cicadas filling their heads. Others portray the effects as a wall of sound, in one place but not another, as if they are deliberately targeted. Most recently, in January 2020 a pair of National Safety Council staffers experienced symptoms just outside the White House, with one telling Adam Entous of The New Yorker that when it hit, he felt "as if I was going to die."

For the past four years, US intelligence agencies, the Departments of State and Defense, the White House, and governmental and non-governmental medical experts have been analyzing the data, looking for the root cause of Havana Syndrome. A major issue is that symptoms and severity differ from person to person, plus there is little rigorous data. Information shared between government agencies and medical institutions has lacked uniformity, leading to skepticism about the efficacy of these claims. Although government officials publicly call Havana Syndrome "anomalous health incidents," major media outlets label them attacks--and it seems that top officials privately refer to them as attacks, as well. Spokespeople for the State Department, Pentagon, and White House seem wary of antagonizing geopolitical rivals without proof.

From <<https://www.american.edu/sis/centers/security-technology/havana-syndrome.cfm>>

What are the symptoms of Havana syndrome?

Symptoms of what became known as the Havana syndrome were first reported by CIA officials and State Department employees working at the American embassy in the Cuban capitol in [late 2016](#). They described hearing harsh mechanical sounds and/or experiencing uncomfortable pressure, like the sensation of driving fast in a car with one window partially down. Some sufferers have [said](#) that when the symptoms first emerged, it felt like they were being hit with a beam of energy. Vertigo, vision problems, and difficulty concentrating have also been [reported](#). Hearing loss followed the auditory symptoms for some of the diplomats and agents, with some cases intense enough that employees were forced to end their tours early and return to the U.S. for study and outpatient treatment.

Some cases have involved experiencing pain only in specific locations — feeling symptoms in certain hotel rooms or apartments but nowhere else. The New York *Times* [reports](#) that in 2019, a military officer overseas drove into an intersection and felt intense nausea and headaches, which subsided once they drove off. Others have developed long-term issues, including severe headaches, insomnia, and hearing problems. One official told [NBC News](#) that as many as 200 officials have experienced Havana syndrome symptoms, almost half of whom are CIA agents or their families, with the other half split between Defense Department and State Department employees.

From <<https://nymag.com/intelligencer/article/what-is-havana-syndrome-symptoms-causes.html>>

Impact on American diplomats [\[edit\]](#)

Some U.S. embassy workers have experienced lasting health effects, including one [unidentified diplomat who is said to now need a hearing aid](#).^[26] The State Department declared that the health problems were either the result of an attack or due to exposure to an unknown device,^[27] and declared that it was not blaming the Cuban government but would not say who was to blame.^[28] Affected people described symptoms such as hearing loss, memory loss, and nausea.^[27] Speculation centered around a [sonic weapon](#),^[29] with some researchers pointing to [infrasound](#) as a possible cause.^[30]

From <https://en.wikipedia.org/wiki/Havana_syndrome>

What are the symptoms of Havana syndrome?

In late 2016, deployed diplomats heard a loud piercing sound at night and felt intense pressure in the face. [Pain](#), [nausea](#), and [dizziness](#) followed. While the sound stopped eventually, some people complained of continued [pain](#) and [dizziness](#) along with trouble concentrating. The symptoms were debilitating enough to interfere with their work during the period of deployment.

In the years that followed, many intelligence officers and military personnel reported symptoms such as [confusion](#), [nausea](#), and disorientation that typically started with a sudden onset of pain and pressure in the head and ears. They reported other symptoms such as [difficulty concentrating](#), [brain fog](#), [memory problems](#), light sensitivity, and [sleep](#)-related complaints (drowsiness and [insomnia](#)).

The long-term sequelae of Havana syndrome include:

- [Migraine](#)
- [Problems with distant vision](#)
- [Squinting](#)
- [Recurrent vertigo](#)
- [Nosebleeds](#)

Experts state that overall symptoms are akin to those reported by individuals with [head injuries](#), although none of the personnel reported a blow to the head or related preexisting health conditions.

From <https://www.medicinenet.com/what_is_havana_syndrome/article.htm>

What is the HAVANA Act?

On July 6, 2021, the U.S. Senate unanimously passed legislation to support American public servants who have incurred brain injuries from possible directed energy attacks or Havana syndrome, called the HAVANA (Helping American Victims Afflicted by Neurological Attacks) Act.

The Act, which was authorized by Senator Susan Collins along with the Intelligence Committee, plans to lend financial support to individuals who have suffered from Havana syndrome. Both the Central Intelligence Agency (CIA) and State Department will create regulations detailing fair and equitable criteria for paying the victims.

The HAVANA Act is an endeavor by the U.S. government to acknowledge the hardships of afflicted U.S. public officers, providing financial aid and legislative changes to help cope with the condition.

From <https://www.medicinenet.com/what_is_havana_syndrome/article.htm>

What is the new government task force focusing on?

After years of unexplained illnesses undermining American intelligence, [the CIA announced](#) last December that it would conduct a focused investigation on the phenomenon, led by senior officers within the agency and the Office of the Director of National Intelligence. When Biden's CIA director William Burns was confirmed this March, he vowed to redouble the effort. "I am absolutely determined — and I've spent a great deal of time and energy on this in the four months that I've been CIA director — to get to the bottom of the question of what and who caused this," Burns [told](#) NPR earlier this month. As part of that effort, he has tasked a veteran officer who helped lead the search for Osama bin Laden with helming the task force. The agent's identity [remains undercover](#). Unlike the [landmark UFO report](#) submitted to the Senate in June — and its follow-up on recommendations for better data-collection practices due [early this fall](#) — there is no firm timeline for the intelligence probe into the Havana syndrome.

The Senate also took action in June, passing the bipartisan [Helping American Victims Afflicted by Neurological Attacks \(HAVANA\) Act](#). While it may take some time to discover what causes Havana syndrome, the act provides additional financial and medical resources for American officials suffering with symptoms.

From <<https://nymag.com/intelligencer/article/what-is-havana-syndrome-symptoms-causes.html>>

Senate OKs Bill That Would Provide Aid For Mysterious 'Havana Syndrome' Injuries

The U.S. Senate on Monday voted unanimously to pass legislation that would provide additional resources for American officials suffering from so-called "Havana Syndrome" — a mysterious set of symptoms that first affected federal employees stationed in Cuba in 2016.

The bipartisan bill — Helping American Victims Afflicted by Neurological Attacks (HAVANA) Act — would authorize financial support for U.S. officials reporting symptoms related to the syndrome, including headaches, nausea, hearing and vision changes, vertigo and memory loss.

"Far too many 'Havana Syndrome' victims have had to battle the bureaucracy to receive care for their debilitating injuries. American personnel who have undergone these attacks while serving our country should be treated the same way we would treat a soldier who suffered a traumatic injury on the battlefield," Maine Republican Sen. Susan Collins, a coauthor of the bill, said in a statement.

Beginning in late 2016, dozens of U.S. Embassy staff in Havana, Cuba, and later in Guangzhou, China, complained of symptoms including cognitive difficulties.

The New York Times reported recently that the health incidents have now affected more than 130 federal personnel.

<https://www.npr.org/2021/06/07/1004195917/senate-oks-bill-that-would-provide-aid-for-mysterious-havana-syndrome-injuries>

What could be the cause of Havana syndrome?

Initially, experts suspected that Havana syndrome may be caused by either accidental or deliberate exposure to a toxic chemical, pesticide, or drug. No traces of such agents, however, were found in affected people or their homes.

The most likely cause of Havana syndrome is assumed to be some type of a mechanical device that emits **ultrasonic or microwave energy**:

- Such radiofrequency energy exposure through highly specialized bioweaponry could potentially create microbubbles in the fluid inside a person's ear. When those bubbles travel through the blood into the brain, they can cause minute air emboli that result in cell damage, similar to decompression sickness (disorder that deep-sea divers develop if they surface too quickly),
- Another explanation is that symptoms may be due to direct penetration of radiofrequency waves into the skull, which disrupts electrical and chemical activity in the brain and rewires certain neural pathways. This rewiring may be the reason that the symptoms seem profound and have long-lasting sequelae.

Although debilitating, Havana syndrome is not fatal, and all afflicted individuals are still alive.

What are the leading theories on what might cause it?

In the initial investigation into the phenomenon, U.S. officials **reportedly** believed that Americans in Cuba had been targeted with a covert sonic weapon that operated outside the normal range of human hearing.

Four years later, a **leading theory favored by some intelligence officials purports that the symptoms are an unintended consequence of an energy device to collect data from smartphones or laptops**. After seeing its success impacting people, foreign governments may now be weaponizing the symptoms intentionally. Last December, scientists with the National Academies of Sciences, Engineering, and Medicine published an **assessment** proposing that the symptoms were being caused by a **directed, pulsed radio frequency (RF) energy device** — a form of energy that includes microwaves. To date, intelligence officers **have yet to find** definitive evidence that the symptoms are being caused by such a device. And while some officials in the Trump and Biden administrations believe Russian intelligence is responsible for the attacks, they have not yet found solid evidence linking the GRU to specific cases.

As BuzzFeed News **reports**, Congress first instructed the Centers for Disease Control and Prevention to study the ailment in 2018, which resulted in the **Cuba Unexplained Events Investigation**. The report found that the officials' medical histories could not explain their symptoms and that the delay between the pain experienced and subsequent testing "hindered CDC's ability to discriminate patterns in the data." One neurologist who spoke to BuzzFeed News determined that the study's conclusions suggested that "essentially the CDC is saying that they have no idea what happened in Cuba." More concretely, **The New Yorker** spoke with specialists at the University of Pennsylvania's Center for Brain Injury and Repair, who used advanced MRIs to **study the brains** of 40 American patients stationed in Havana. While there were signs of brain damage, the team found no signs of impact to the patients' skulls. One doctor told Adam Entous that it was as if they had a "concussion without a concussion."

From <<https://nymag.com/intelligencer/article/what-is-havana-syndrome-symptoms-causes.html>>

The initial fear was that the Cubans were triggering the symptoms with some kind of sonic weapon.

Research conducted by Dr. Alon Friedman of Ben-Gurion University and colleagues at the Dalhousie University Brain Repair Center in Nova Scotia, Canada, points to a different culprit: overexposure to pesticides — in particular, fumigation to stop the spread of the Zika virus prominent around that time.

They found a correlation between the individuals most affected and the number of fumigations that were performed at their residences. Both the Cuban and Canadian authorities were fumigating more frequently than usual, according to records from the Canadian embassy.

By conducting brain scans on the affected individuals using MRI and magnetoencephalography (a functional neuroimaging technique for mapping brain activity), the multidisciplinary research team of 15, led by Friedman in Israel, concluded that exposure to cholinesterase inhibitors in organophosphorus insecticides was the probable cause. Cholinesterase is an enzyme required for proper nervous-system functioning.

The researchers detected different levels of damage in an area of the brain that is susceptible to neurotoxins and that can cause the kind of symptoms reported by the diplomats and their families.

The **report** says that the results "support the diagnosis of acquired brain injury."

The report also compares the symptoms in Cuba with other neurotoxic attacks over history, including the Tokyo subway sarin gas attack in 1995 and the death of the half-brother of North Korean leader Kim Jong-un in Kuala Lumpur in 2017. Those cases resulted from high-dose exposure to neurotoxins, whereas the Cuban incidents were consistent with low-dose exposure.

From <<https://www.israel21c.org/israeli-researchers-crack-mystery-of-havana-syndrome/>>

As more information comes to light and medical studies are completed, two distinct positions on the causes of Havana Syndrome are emerging. Dominant schools of thought stem from reactions to two reports both published in 2020, one by the **National Academies of Science, Engineering, and Medicine** and the other by the **Journal of the American Medical Association (JAMA)**. The 2020 National Academies report concluded that there were four plausible attack vectors on US officials: directed radio-frequency energy, chemicals, infectious agents, and psychological and social factors. The JAMA report reached similar conclusions. Both reports gave credence to the phenomenon but also cautioned that lack of scientific evidence limits conclusions and that each potential cause is speculative.

Of the four plausible attack vectors identified in the **JAMA** and **National Academies** reports, **directed energy weapons were deemed the most plausible**. This school of thought is **supported by former government officials** such as **John Bolton, Mark Esper, and several unnamed Biden Administration top advisors**. Recently, while not explicitly endorsing a particular theory CIA Director William Burns emphasized the **"very strong possibility"** that Havana Syndrome is the result of intentional attacks, in a recent interview with NPR. Current or former US government scientists who have worked on biotechnology and security programs likewise support them. In a June 2021 article in *The (London) Guardian*, James Giordano, a professor of neurology and ethics at Georgetown University and a senior fellow in biotechnology, biosecurity and ethics at the US Naval War College, **explained how the United States built prototypes of portable microwave weapons** in 2004 but abandoned them due to ethical concerns, such as testing on humans or animals. But other countries such as China and Russia continued to work on **long term directed energy weapon research and development**. Another expert on microwave energy and biological effects, James Lin of the University of Illinois, points out how development of the technology has reached a point where it is **such a weapon could be scaled to fit into a van or SUV**. A technology pioneered by the Russians in the 1970s, these new weapons now have possible ranges of 500 to 1,000 yards.

The tentative conclusions from the 2020 JAMA and National Academies reports also yield skepticism in both the US federal government and the civilian scientific community. The main detractors from the theory of directed energy weapons are the FBI as well as neurologists and bioengineers at King's College London and the University of Pennsylvania. After the first set of cases, the FBI dispatched a team to investigate. **In a presentation to State Department officials, the team concluded that the victims were suffering from a mass psychogenic illness, where individuals experience neurological symptoms with no physical or environmental explanation**. But **as reported by Adam Entous of The New Yorker**, the FBI had based its conclusions on secondary source material and had not directly spoken to any of the victims directly. Outside of the US federal government, Kenneth Foster of the University of Pennsylvania, and Peter Zimmerman of King's College **refuted the directed energy hypothesis as implausible**.

From <<https://www.american.edu/sis/centers/security-technology/havana-syndrome.cfm>>

Microwave weapons that could cause Havana Syndrome exist, experts say



A slide from the 60s or early 70s from a CIA briefing on microwave radiation. A microwave weapon has been suggested as a possible cause of 'Havana Syndrome' suffered by US officials. Photograph: Handout
Russia and possibly China have developed technology capable of injuring brain and a US company made a prototype in 2004

Portable microwave weapons capable of causing the mysterious spate of "Havana Syndrome" brain injuries in US diplomats

and spies have been developed by several countries in recent years, according to leading American experts in the field. A US company also made the prototype of such a weapon for the marine corps in 2004. The weapon, codenamed **Medusa**, was intended to be small enough to fit in a car, and cause a "temporarily incapacitating effect" but "with a low probability of fatality or There is no evidence that the research was taken beyond the prototype phase, and a report on that stage has been removed from a US navy website. Scientists with knowledge of the project said that ethical considerations preventing human experimentation contributed to the project being shelved – but they said such consideration had not hindered US adversaries, including **Russia**, and possibly China.

"The state of that science has for the most part been, if not abandoned, pretty much left fallow in the United States – but it has not been fallow elsewhere," said James Giordano, professor of neurology and ethics at Georgetown University Medical Center. Giordano, who is also senior fellow in biotechnology, biosecurity and ethics at the US Naval War College, was brought in as an adviser by the government in late 2016 after about **two dozen US diplomats began falling sick in Havana**. He later took part in an assessment for US Special Forces Command on which countries were developing the technology and what they had achieved. "It became clear that some of the work that was conducted in the former Soviet Union was taken up again by Russia and its satellite proxies," Giordano said, adding that China had also developed directed energy devices to test the structure of various materials, with technology which could be adapted to weapons. A second **major wave of brain injuries among US diplomats and intelligence officers took place in China in 2018**.

Giordano is restricted from giving details on which country had developed what kind of device but he said the new weapons used microwave frequencies, able to disrupt brain function without any burning sensation. "This was important – and rather frightening – to us, because it represented a state of advancement and sophistication of these types of instruments that heretofore had not been thought to be accomplished," he said.

If a US adversary has succeeded in miniaturising the directed energy technology needed to inflict tissue damage from a distance, it makes such weapons a more plausible explanation for Havana Syndrome. More than **130 US officials**, from the state department, CIA and national security council (NSC), have suffered from symptoms, including dizziness, loss of balance, nausea and headaches, first identified in Cuba. The impact on some of the victims has been **debilitating and long-lasting**.

Some of the most recent incidents have involved NSC officials experiencing **crippling symptoms in broad daylight in Washington**. The state department, CIA and Pentagon have all launched investigations, but have yet to come to conclusions. A **National Academy of Sciences report** in December, found that the Havana Syndrome injuries were most likely caused by "directed pulsed radio frequency energy".

Sceptics of the microwave weapon theory have pointed to decades of US efforts to build such a device during the cold war and since, **without any confirmed success**. They have also argued that a weapon capable of inflicting brain injury from a distance would be too unwieldy to use in urban areas.

However, James Lin, the leading US authority on the biological impact of microwave energy, said a large apparatus would not be needed to focus energy on a small area, heating it a minute amount and causing "a **thermoelastic pressure wave**" that travels through the brain, causing damage to soft tissue.

The pressure wave would initially be experienced by the target as sound. Many of the US diplomats, spies, soldiers and officials whose symptoms are being studied as part of the Havana Syndrome investigation reported hearing strange sounds at the onset of the attacks. "You can certainly put together a system in a couple of big suitcases that will allow you to put it in a van or an SUV," Lin, professor emeritus in the electrical and computer engineering department at the University of Illinois, said. "It's not something that you need to have enormous amounts of space or equipment to do it."



Unexplained illnesses were first discovered among US diplomats in Havana in 2016. Photograph: Diego Grandi/Alamy Stock Photo
The microwave weapon project for the US Marine Corps, first reported in **Wired**, was first developed by a company called **WaveBand Corporation**. Codenamed Medusa – a contrived acronym for Mob Excess Deterrent Using Silent Audio – the weapon used the same technology as that suggested by Professor Lin, the "microwave audio effect", which created rapid microwave pulses that slightly heated soft tissue in the brain,

The country's interest in weaponising microwaves extended beyond the end of the Cold War. Reports say from the 1990s, the US Air Force had a project codenamed "Hello" to see if microwaves could create disturbing sounds in people's heads, one called "Goodbye" to test their use for crowd control, and one codenamed "Goodnight" to see if they could be used to kill people. Reports from a decade ago **suggested these had not proved successful**.

From <<https://www.bbc.com/news/world-58396698>>

Directed Energy Weapons: Counter Directed Energy Weapons and High Energy Lasers

Directed energy weapons (DEWs) are defined as electromagnetic systems capable of converting chemical or electrical energy to radiated energy and focusing it on a target, resulting in physical damage that degrades, neutralizes, defeats, or destroys an adversarial capability. Navy DEWs include systems that use High Energy Lasers (HEL) that emit photons, and High Power Microwaves (HPM) that release radiofrequency waves. The U.S. Navy uses DEWs for power projection and integrated defense missions. The ability to focus the radiated energy reliably and repeatedly at range, with precision and controllable effects, while producing measured physical damage, is the measure of DEW system effectiveness. Conversely, capabilities to increase the resilience or survivability of platforms or Sailors from DEW threats are part of the Counter Directed Energy Weapons (CDEW) program.

The Office of Naval Research has three weapons-oriented research concentration areas: **High Power Microwaves (HPM); Ultra-Short Pulse Laser (USPL) and Atmospheric Characterization;** and Counter-Directed Energy Weapons and High Energy Lasers (CDEW & HEL).

Research Concentration Area: CDEW and HEL

High energy lasers (HELs) lasers and high-power microwaves (HPM) systems as weapons have been under investigation since the 1960s and 70s. As an example of naval platform survivability and self-defense against small boat threats, the Office of Naval Research developed and tested the Maritime Laser Demonstrator (MLD), the first laser weapon system operated at sea. ONR and NRL later worked collaboratively with the Naval Sea Systems Command on the Solid State Laser Quick Reaction Capability Program (SSL-QRC) to actively deploy the first military HEL, the Laser Weapons System (LaWS) on the USS Ponce. Today, HEL research continues to offer breakthroughs in performance for continuous wave (CW) laser weapons.

The Counter-Directed Energy Weapons (CDEW) Program was initiated in response to the rapid development of high energy lasers (HEL) and high-power microwave (HPM)/high-power radio frequency (HPRF) threats being developed by potential foreign adversaries. The ONR Counter Directed Energy Weapons (CDEW) research program expands the understanding of the known sciences through both research and component testing to increase survivability and self-defense capabilities for U.S. Navy platforms. Directed energy weapons technology advancements and proliferation has raised the urgency of developing low-cost CDEW technologies for rapid deployment to Navy units. The ONR CDEW program addresses emerging directed energy threats in an operational, maritime construct containing three layers of defense: DEW detection, DEW effects mitigation, and unit protection.

Research Challenges and Opportunities

- Scientific modeling and simulation of effects of HPRF and HEL capabilities against materials, electronics, sensors, and platforms in a maritime environment. These include high fidelity modeling, simulation and experimentation of material responses that lead to validated target-damage assessments or alternative mechanisms offering controlled, optimized effects during dynamic engagements.
- The simulation and validation of CW laser beams' optical performance and material (including metamaterials) responses in complex aero-thermal and aero-optics conditions, or that offers related aperture optical coating toughness, is of interest.
- Novel instrumentation for detection of HEL and HPRF irradiation, including component development or the modeling and sensing of low level laser irradiation for off-axis (off-target directed) detection, characterization and source geo-location.
- HEL and HPRF mitigation and protection components, including novel filters, signal-noise mitigation and utilizing material obscurants. Techniques to synthetically degrade the atmosphere for directed energy propagation are of interest, or where they otherwise provide protection to sensors, electronic systems, platforms and naval personnel. Efforts proposed for this research challenge should have clear and understandable scientific, technical or operational merits for use in the maritime environments where naval platforms (air, surface, subsurface, Marine, etc.) operate and might encounter adversaries that utilize directed energy capabilities.
- HEL and HPM protection methods, including laser material hardening and electronic hardening, such as the development of metamaterials, nano scale materials, and nonlinear materials that enhance and ensure platform survival, operation and integrity. Research includes, but is not limited to, toughening and protection methods for electronic/optical subsystem or functions like communications, navigation, and ISR sensor subsystems, and for occupant protection. Research related to active and passive circuit protection that limit HPRF attack effectiveness.
- For HEL, research leading to novel naval laser subsystem, beam director and fire control architectures, including advanced design power architectures for low-duty cycle and CW laser applications offering advantages of reduced size, weight and power with cooling (SWAP-C) to reduce naval platform integration impact. Of particular interest are CW laser components, offering higher brightness with high power beam combining technologies, or controlled micro-channel optical component cooling methods for the reduction of thermal distortions leading to high beam quality. Additionally, research leading to improvements in DEW system tracking sensors, target illuminators and automated target recognition components performance or robustness offering high accuracy pose/trajectory estimation, including those which offer tracking through intermittent or partial obscured maritime viewing conditions. Efforts proposed to this research challenge should have clear and understandable merit for use in the maritime environments where naval platforms operate.
- Sensors and novel instrumentation that are unique to naval HEL weapons' target tracking functions, including low noise, high frame rate tracker cameras, and those with larger formats (increased number of pixels on target) that have selectable windowing. The intent is to increase accuracy in all weather conditions against high speed, maneuvering targets. These instruments might include advanced, solid state target illuminator lasers (TILs) with higher power and pulse repetition frequency/band that are synchronized and matched to high camera framing rates, and those which would enable single point, real-time, atmospheric turbulence measurement capabilities. In cases where proposals include innovative TIL lasers, all wavelength and nominal ocular hazard distances (NOHD) for laser eye safety concerns shall need to be addressed.

From <<https://www.onr.navy.mil/en/Science-Technology/Departments/Code-35/All-Programs/aerospace-science-research-351/directed-energy-weapons-cdew-and-high-energy-lasers>>

causing a shockwave inside the skull.

WaveBand was given \$100,000 for the prototype, which according to the [specifications of the contract](#) would "be portable, require low power, have a controllable radius of coverage, be able to switch from crowd to individual coverage, cause a temporarily incapacitating effect, have a low probability of fatality or permanent injury, cause no damage to property, and have a low probability of affecting friendly personnel".

A [navy document in 2004](#) (which has since been removed from the Navy Small Business Innovation Research site) said the hardware had been designed and built. "Power measurements were taken and the required pulse parameters confirmed," it said. The document added: "Experimental evidence of MAE [microwave auditory effect] was observed."

WaveBand's former president and CEO, Lev Sadovnik, said he was limited in what he was allowed to say about the project, but said the immediate effects of MAE were disorientation and the impression of hearing sounds.

Sadovnik said that a device capable of causing Havana Syndrome symptoms could be relatively portable.

"It's quite conceivable that you can hide it in a car, or in a van but it would not work over a long distance," he said. "You can do it through a wall, say, if you are in the next room in a hotel."

Sadovnik said the Medusa prototype was not powerful enough to cause lasting harm, nor would that be allowed. But he said Russia was more advanced in understanding the human impact of microwave weapons – partly because it did not face the same ethical constraints.

"We have here very strict limitations, of course, on human tests and animal testing," he said. "The Russians do not adhere to these standards."

Giordano said that different political and ethical norms in Russia and [China](#), create "unique opportunities to advance bioscientific and technological development in ways that would be untenable in the United States and programs of our Nato allies".

Although many US officials and victims believe that Russia is behind the attacks, there is so far no compelling evidence that Moscow is responsible. In some cases, Russian military intelligence (GRU) vehicles [are reported to have been close to the scene of an apparent attack](#). But it would not be unusual for the GRU to tail US officials.

The Russians certainly had a long history of using microwave technology against US diplomatic missions. The embassy in Moscow was found to be [bathed in microwave radiation](#) in the 1960s and early 1970s, though the intention behind it was never clear. That episode erupted into a scandal when it emerged the US government had withheld the fact from its own diplomats.

At the same time, the US was spending huge amounts trying to develop its own directed energy weapons, both laser- and microwave-based. Mark Zaid, a lawyer [representing some of the Havana Syndrome victims](#), has a CIA briefing slide appearing to date from the 1960s or 1970s which shows a building being hit by microwaves from a nextdoor structure. Zaid said the slide was among the personal effects left by a deceased agency officer.



Tourists ride classic convertible cars on the Malecón beside the US embassy in Havana, Cuba. Photograph: Desmond Boylan/AP

"The military loves death rays. Everybody loves death rays – and lasers had some of the characteristics of death rays so people kind of got excited about that," recalled Cheryl Rofer, who worked on laser and auditory weapon research in the 1970s at Los Alamos National Laboratory in New Mexico.

That auditory research eventually led to the Long Range Acoustic Device, or "[sound cannon](#)", used by some police forces against demonstrators last summer. But it did not lead to any "death rays".

"Thinking about something and actually building it are two different things," Rofer said. And the experience of seeing billions spent over the decades with little to show for it, has left her sceptical about new claims of microwave weapons development.

"The military has a whole lot of money sloshing around, and they will try lots of different things, and some of them are good and some of them are not so good."

Giordano said, however, that while development had stalled in the US, it had been continued by America's adversaries. The initial two dozen cases in Havana, he said, represented a field test of the equipment.

He said that while the US focuses on expensive weapons for traditional warfare, Russia, China and others are "very interested in, and dedicated to, developing non-kinetic tools that can be leveraged below the threshold of what would formally be considered acts of war, so as to engage in processes of mass disruption".

From <https://www.theguardian.com/science/2021/jun/02/microwave-weapons-havana-syndrome-experts>

MEDUSA

Monday, September 20, 2021 8:33 PM

Phase I Summary Report CONTACT INFORMATION

Government Contact

Mr. George Gibbs
Email: george.gibbs@usmc.mil
Phone: (703)432-3676
Fax:

Point of Contact

Dr. Lev Sadovnik
Email: lsadovnik@waveband.com
Phone: (949)253-4019
Fax: (949)253-4089

Firm Information

WaveBand Corporation
17152 Armstrong Avenue
Irvine, California 92614-5718
United States
<http://www.wavebandcorp.com>

AWARD DETAILS

Contract

M67854-04-C-1012

Topic

N03-163

Solicitation

03.2

SYSCOM

MARCOR

Award Amount

99965.00

Phase

I

Program

Navy SBIR

Start / End Date

11/19/2003 - 05/19/2004

FY Reported

2004

Title

Remote Personnel Incapacitation System

SUMMARY INFORMATION

Objective of Phase Effort

The main goal of the Phase I project was to design and build a breadboard prototype of a temporary personnel incapacitation system called MEDUSA (**Mob Excess Deterrent Using Silent Audio**). This non-lethal weapon is based on the well established microwave auditory effect (MAE). MAE results in a strong sound sensation in the human head when it is irradiated with specifically selected microwave pulses of low energy. Through the combination of pulse parameters and pulse power, it is possible to raise the auditory sensation to the "discomfort" level, deterring personnel from entering a protected perimeter or, if necessary, temporarily incapacitating particular individuals.

Summary of Results from the Phase I Effort

The major results of the Phase I effort were that - An operating frequency was chosen - Hardware requirements were established (commercial magnetron, high-voltage pulse former) - Hardware was designed and built - Power measurements were taken and the required pulse parameters confirmed - Experimental evidence of MAE was observed

Potential Applications and Benefits

Potential applications of the MEDUSA system are as a perimeter protection sensor in deterrence systems for industrial and national sites, for use in systems to assist communication with hearing impaired persons, use by law enforcement and military personnel for crowd control and asset protection. The system will: be portable, require low power, have a controllable radius of coverage, be able to switch from crowd to individual coverage, cause a temporarily incapacitating effect, have a low probability of fatality or permanent injury, cause no damage to property, and have a low probability of affecting friendly personnel.

From <<https://web.archive.org/web/20080409063721/http://www.navysbirprogram.com/NavvSearch/Summary/summary.aspx?pk=F5807D681B19-4235-B140-950CE2E19D08>>

Mass Psychogenic Illness

Monday, September 20, 2021 8:45 PM

Mass psychogenic illness involves the spread of illness symptoms through a population where there is no infectious agent responsible for contagion. MPI is distinct from other types of collective delusions by involving physical symptoms. According to Balaratnasingam and Janca, "Mass hysteria is to date a poorly understood condition. Little certainty exists regarding its etiology." Qualities of MPI outbreaks often include:


- symptoms that have no plausible organic basis;
- symptoms that are transient and benign;
- symptoms with rapid onset and recovery;
- occurrence in a segregated group;
- the presence of extraordinary anxiety;
- symptoms that are spread via sight, sound or oral communication;
- a spread that moves down the age scale, beginning with older or higher-status people;
- a preponderance of female participants.

British psychiatrist Simon Wessely distinguishes between two forms of MPI:

- *Mass anxiety hysteria* "consists of episodes of acute anxiety, occurring mainly in schoolchildren. Prior tension is absent and the rapid spread is by visual contact."

- *Mass motor hysteria* "consists of abnormalities in motor behaviour. It occurs in any age group and prior tension is present. Initial cases can be identified and the spread is gradual. ... [T]he outbreak may be prolonged." While his definition is sometimes adhered to, others such as Ali-Gombe et al. of the University of Maiduguri, Nigeria contest Wessely's definition and describe outbreaks with qualities of both mass motor hysteria and mass anxiety hysteria. The DSM-IV-TR does not have specific diagnosis for this condition but the text describing conversion disorder states that "In 'epidemic hysteria', shared symptoms develop in a circumscribed group of people following 'exposure' to a common precipitant."

From <https://en.wikipedia.org/wiki/Mass_psychogenic_illness>

Mass psychogenic illness	
Other names	Mass hysteria, epidemic hysteria, mass sociogenic illness, mass psychogenic disorder
	
Dancing plagues of the Middle Ages are thought to have been caused by mass hysteria	
Specialty	Psychiatry, Clinical Psychology
Symptoms	Headache, dizziness, nausea, abdominal pain, cough, fatigue, sore throat
Risk factors	Childhood or adolescence, intense media coverage.
Differential diagnosis	Actual diseases, mass delusions, somatic symptom disorder

From <https://en.wikipedia.org/wiki/Mass_psychogenic_illness>

Contagious' stress

Robert W Baloh, a Professor of Neurology at UCLA, has long studied unexplained health symptoms. When he saw the Havana syndrome reports, he concluded they were a mass psychogenic condition. He compares this to the way people feel sick when they are told they have eaten tainted food even if there was nothing wrong with it - the reverse of the placebo effect. "When you see mass psychogenic illness, there's usually some stressful underlying situation," he says. "In the case of Cuba and the mass of the embassy employees - particularly the CIA agents who first were affected - they certainly were in a stressful situation." In his view, every-day symptoms like brain fog and dizziness are reframed - by sufferers, media and health professionals - as the syndrome. "The symptoms are as real as any other symptoms," he says, arguing that individuals became hyper-aware and fearful as reports spread, especially within a closed community. This, he believes, then became contagious among other US officials serving abroad.

From <<https://www.bbc.com/news/world-58396698>>

Who was responsible?

Monday, September 20, 2021 8:01 PM

Russian responsibility hypothesis^[edit]

Many current and former U.S. officials identified Russia as likely responsible for the attacks,^[a] a suspicion shared by both Trump and Biden administration officials.^[a] This view was shared by CIA analysts on Russia, State Department officials, outside science experts, and several of the victims.^[a] Russia has a history of researching, developing, and using weapons that cause brain injuries, such as the Cold War-era "Moscow Signal" targeting the American embassy in Moscow.^[a] A 2014 NSA report raised suspicions that Russia used a microwave weapon to target a person's living quarters, causing nervous system damage; and Russia has an interest in disrupting cooperation among the U.S., China, and Cuba.^[a] The U.S. diplomats stationed in China and Cuba who reported ailments were working to increase cooperation with those countries, and some CIA analysts voiced suspicion Russia thus sought to derail their work.^[a] In May 2021, *Politico* reported that three current and former U.S. officials "with direct knowledge of the discussions" said that the U.S. government suspected that Russia's military intelligence agency, GRU, was behind alleged attacks, although the U.S. Intelligence Community have not "reached a consensus or made a formal determination."^[a] In May 2021, *The New Yorker* reported that the U.S. government's "working hypothesis" was that GRU agents "have been aiming microwave-radiation devices at U.S. officials to collect intelligence from their computers and cell phones, and that these devices can cause serious harm to the people they target."^[a] The U.S. government has not publicly accused Russia of the attacks; U.S. intelligence officials privately call the events "attacks" but publicly call them "anomalous health incidents."^[a] According to two officials interviewed by *Politico*, "While investigators have not determined definitively that these incidents are caused by a specific weapon, some believe any such device would be primarily transported by vehicle", and "Some could be small enough to fit into a large backpack, and an individual can be targeted from 500 to 1,000 yards away."^[a] James Lin of the [University of Illinois](#), an expert on the biological effects of microwave energy, agreed that a Havana syndrome attack could be caused by a small apparatus that could fit in a van or SUV.^[a]

From https://en.wikipedia.org/wiki/Havana_syndrome>

Who Is Responsible for Havana Syndrome?

Because the Communist Cuban government exercises a significant level of control over the entire island, it would be normal to assume Cuba is responsible for Havana Syndrome—and perhaps they are. Former President Trump was fairly vocal regarding his belief that the Cuban government was responsible for the attack on U.S. and Canadian Embassy diplomats and others. Leading experts in the field point to portable microwave weapons that, they believe, could cause symptoms similar to those experienced by individuals caught in the attacks.

A U.S.-based company actually made a prototype of such a weapon for the marine corps. The prototype was named Medusa, and while it was small enough to fit inside a vehicle, and was said to "incapacitate" the target, it was also considered unlikely to kill or cause permanent injury. The project was scrapped, likely due to ethical considerations regarding human experimentation. This in no way means that our adversaries, including Russia, China, and Cuba, did not continue the experiment.

James Giordano claims China has developed directed energy devices, and a second wave of Havana Syndrome injuries took place in China in 2018. Giordano believes these weapons use microwave frequencies that can disrupt brain functions with no sensation of burning. Therefore, a plausible explanation for Havana Syndrome is that an adversary of the United States miniaturized and weaponized this directed energy technology, allowing it to be used from a distance. If, in fact, the Cuban Government committed intentional acts that led to what we now call Havana Syndrome, the government could be held civilly liable.

From <https://sullolaw.com/accidents-injuries/havana-syndrome-injury-lawsuits/who-is-responsible-for-havana-syndrome>>

Questions about the source of the attack remain but, some intel professionals would like to know whether or not China has played a role in the creation and use of this weaponry.

It is believed that China is not anxious for Vietnam to have a strong relationship with the Biden Administration. Local press in China even suggested that U.S. was hoping to cozy up to China's South - East neighbors in an effort to alienate these countries from China itself. As such, intel experts suggest the use of a sonic super secret Chinese weapon could have been intentional. Nonetheless, there is no evidence to yet suggest China is behind the attacks — at present no information surrounding the source of such attacks is available.

From <https://trishintel.com/havana-syndrome-what-is-it-and-whos-responsible/>>

The U.S. government is intensifying its efforts to establish the cause of the "Havana Syndrome" as reported cases proliferate.

The prevalent but unofficial hypothesis is that the cases are the result of attempted intelligence collection by Russian government operatives who are using directed energy technology to gather information from cell phones or computers, but which has damaging neurological effects on its human targets. [CBS News (July 27 2021)]

The U.S. intelligence community has said it has not determined the cause of the incidents or even whether a foreign actor is responsible. [Office of the Director of National Intelligence]

The new CIA task force chief, who at one point led the CIA's Counterterrorism Center and remains undercover, is expected to boost the use of "targeting" — a term in intelligence collection and analysis to describe a more focused, resource-intensive approach to identifying new leads or existing gaps — in order to invigorate the investigation.

From <https://inteltoday.org/2021/08/18/havana-syndrome-cia-still-investigating-cause-of-havana-syndrome-ailments-affecting-u-s-diplomats-update-top-classified-meeting-report-still-little-evidence/>>