

Japan EMF Information Center
Rapid Response Group*
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Paper: An assessment of illness in U.S. government employees and their families at overseas embassies.

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Introduction: A standing committee of the US National Academies of Sciences, Engineering and Medicine was convened to advise the Department of State (DOS) on unexplained health effects among US Government employees and their families at overseas embassies. Embassy staff in a number of different countries, including Cuba and China, have reported various symptoms that were not common to all employees, and included headaches, nausea, dizziness, loud sounds, feeling of severe pain and intense pressure on the face, as well as cognitive dysfunction.

Similar health complaints were reported by staff at the US embassy in Moscow in the early 1960s to mid 1970s. This was thoroughly investigated by a group from Johns Hopkins University and by the US Food and Drug Administration's Bureau of Radiological Health, who conducted an exhaustive comparison of the health status of State Department employees who served in Moscow, with the health status of US employees working in other Eastern European posts during the same period. These investigations concluded there was no convincing evidence to implicate the exposure to microwaves at the Moscow embassy in the causation of any adverse health effects. However, over 50 years later, radio frequency (RF) fields, including microwave technologies, have made rapid advances, so claims of health effects from embassy staff in overseas locations should be investigated.

This review only addresses the standing committee's conclusion that "...considering the information available to it and a set of possible mechanisms, the committee felt that many of the distinctive and acute signs, symptoms, and observations reported by DOS employees are consistent with the effects of directed, pulsed radio frequency (RF) energy."

Methods: The 19-member committee collected health information and investigated possible causes of these non-specific, clinical signs and symptoms to determine whether they could be caused by infectious disease, chemical exposure, psychological issues or physical stimulation. While experts on microwaves provided reviews of the committee report, it appears from the standing committee membership there were no experts on the health effects of microwaves, specifically as microwave exposure relates to the symptoms reported by embassy staff.

While the committee was able to conduct direct discussions with many of the embassy staff involved, they had no measurement data to work with, and could only make an analysis of the reported symptoms to suggest a cause, thus precluding being able to make definitive conclusions about the causes and origins of the health effects. The committee was not in a position to assess or comment on how these DOS cases arose, such as a possible source of directed, pulsed RF energy and the exact circumstances of any exposures.

Results and discussion: In assessing the clinical symptoms reported by embassy staff, the committee summarised them as follows: “A distinct set of unusual clinical manifestations occurred abruptly in some individuals at the onset of their illness, and the illness became chronic and debilitating for some, but not for all. 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. Most individuals reported that the sound or these other sensations seemed to originate from a particular direction and were perceived only when the individual was in a specific physical location. Some also reported sudden onset of tinnitus, hearing loss, dizziness, unsteady gait, and visual disturbances.”

Following an analysis of possible causes of embassy staff symptoms, the committee finally suggested the most plausible mechanism was directed, pulsed RF energy. Members felt this was consistent with the unusual presentation of acute, directional or location-specific early phase signs, symptoms and observations that staff reported. The committee sought evidence for this mechanism from the scientific literature, which is substantial and the quality of the studies is highly variable.

Scientific support for the committee’s probable mechanism include conclusions from studies that have not been replicated or were of inadequate quality. A better approach would have been to cite “blue ribbon” committees that have conducted comprehensive reviews of all relevant studies, and drawn conclusions that could be established from quality science, such as those of the European Commission or the International Commission on Non-Ionizing Radiation Protection that recently published their updated RF standards, and specifically addresses this topic.

Human studies: The committee’s statement that symptoms such as dizziness, headache, fatigue, nausea, anxiety, cognitive deficits and memory loss are “consistent with known RF effects” is inconsistent with the results of dozens of high-quality, double-blind experiments conducted with human volunteers. Systematic reviews of these studies have not provided evidence for a relation between the RF exposures and the symptoms or physiological responses that might explain embassy staff symptoms. Similarly, no relationship has been found for long term exposures from observational studies.

Sound perception and microwave hearing: The perceived loud sound and its directional dependence described by embassy staff were reasons why pulsed RF exposure might be a focus, since “microwave hearing” is a well-documented phenomenon. However, the induced sound by pulsed microwaves is very weak, even with the head exposed next to the antenna, and can only be heard in a very quiet environment. The committee noted most individuals reported the sound or other sensations seemed to originate from a particular direction. This does not support the cause of embassy staff symptoms being exposure to pulsed RF causing microwave hearing, since the location of the perceived sound was a short distance behind the head and at the same location regardless of the body’s orientation to the pulsed beam.

In summary to elicit auditory sensations, individuals must be exposed to intense but brief (microsecond) pulses of microwave energy. The pulses are only sufficient to heat brain tissue by a few microdegrees in a few microseconds, and the resulting thermal expansion launches an acoustic wave in the brain that the subject perceives as sound. The acoustic pressures are many orders of magnitude too weak to cause tissue damage. People elicit audible sensations only because of the exquisite sensitivity of the human auditory system.

When US personnel in Cuba released a recording of the high-pitched sound they heard, it was analysed by a team of biologists, who identified it as the calling song of a short-tail cricket. Another suggestion of the origin of the sound perceived by embassy staff could be the by-product of ultrasonic listening devices.

Electromagnetic interference: The committee noted that when embassy staff symptoms occurred there was no reported interference with any electrical device. Electronic equipment should have been interfered with or even disrupted by RF fields at the level where microwave hearing would elicit the sensation of “a loud sound”. Further, the RF fields from cell phone base stations are much less than the exposure level for microwave hearing. Interferences with existing telecommunications would reasonably have been expected if such intense microwaves were used.

Mass psychogenic illness: While the committee was not able to reach any conclusion about mass psychogenic illness as a possible cause of the unusual pattern of symptoms, it is a common cause of symptoms that are attributed to a hazardous exposure. It is characterised by subjective symptoms in the absence of any known causes of disease or any identifiable physical exposure. Symptoms are often triggered by an initiating event that is interpreted as threatening, particularly if it coincides with someone else who has a high social status displaying or reporting symptoms. In such incidents, the belief that an exposure is harmful can lead people to experience symptoms, regardless of the nature of the exposure itself. This has previously been demonstrated for RF fields.

Conclusions: Science can never prove that something does not happen. The best science can do is produce high quality studies that provide convincing evidence that an agent does or does not cause an effect. The committee could not rule out other possible mechanisms and considered it likely that a multiplicity of factors explains some cases and the differences between others. However, a more thorough job at reviewing the quality scientific literature should have been done before reaching their conclusion that “the unusual presentation of acute, directional or location-specific early phase signs, symptoms and observations reported by DOS employees [is] consistent with the effects of directed, pulsed radio frequency (RF) energy”.

Factors that decrease the likelihood that the sounds perceived by embassy staff were due microwave hearing include:

- Huge peak and average microwave power densities would be needed to elicit the sensation of "a loud sound". This would require large microwave generating equipment, such as military radars used close to the target.
- Embassy staff did not report any thermal sensation or feeling of warmth that results from exposure to high power microwaves.
- There were no reports of electromagnetic interference that would certainly result from exposure to high power microwaves.
- The reported directional nature of the sound does not fit the description of the microwave hearing effect.

Finally it would be technically challenging to produce RF equipment that could produce loud sounds. The committee produced no convincing evidence that pulsed RF at high or low power can produce the symptoms reported by US embassy personnel in Havana and China. Mass psychogenic illness and related psychological mechanisms remain a plausible explanation for the symptoms.

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Annotation from JEIC:

* Rapid Response Group (RRG): The RRG provides a rapid response on the analysis of newly published scientific studies that JEIC considers important and in need of expert scientific review to provide information for all stakeholders. The RRG is composed of a coordinator and experts in all areas of science appropriate for reviewing and assessing scientific studies. Prof. M. H. Repacholi has served as the coordinator from the time of launch of RRG in 2010.

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