**Re: Cuban Diplomat Symptoms and Radiofrequency Radiation (RFR) Injury**

Regarding the “mystery” illness reported in at least 21 US diplomats in Cuba1 (plus some Canadian ones2) that “has confounded the FBI, the state department and US intelligence agencies involved in the investigation”2, sonic explanations have dominated media reports1-4 but have been justly rejected1, 2. A different cause accounts for all the facts, including the peculiar ones. That explanation is radiofrequency/ microwave radiation (RFR).

**All symptoms described for Cuban diplomats are reported in a subgroup of people who cite symptoms following pulsed RFR exposure**. Insomnia, headaches, tinnitus, hearing loss, cognitive problems, nausea, fatigue, speech problems, and balance problems – which news outlets state are afflicting Cuban diplomats1-5 - are each also reported following RFR exposure6-11. Indeed, insomnia, headache, cognitive problems and tinnitus, were each reported in at least 80% (in a survey we conducted with >200 affected individuals)12, speech and balance problems affecting smaller numbers6, 7, 12. Brain injury – reportedly present in some diplomats -- was manifest on imaging in civilians with RFR symptoms13. Re: brain swelling, cited in some diplomats4: RFR causes “oxidative stress”14, a type of damage that antioxidants defend against. (An analysis found that of 100 peer reviewed studies examining whether low intensity RFR causes oxidative stress, 93 found that it did14.) This disrupts the “blood brain barrier”15-27, and brain edema can follow28, 29.

**Auditory system symptoms – tinnitus and hearing loss -- are prominent in Cuban diplomats** and likely launched the sonic theory of causation for diplomats. While headache, cognitive problems and fatigue arise with many exposures and in many health conditions; tinnitus and hearing loss are more distinctive. These are also distinctive in those reporting symptoms from RFR, and were reported in 80% and 34%, respectively of >200 such individuals in a survey we conducted12. (Other surveys also report these symptoms6, 7.)

**Strange noises are the other irregular feature in Cuban diplomats:** Some reported ringing “or a high pitched chirping” or grinding1. Just such noises are known to arise with RFR in a phenomenon known as the “Frey effect” (also called “RF hearing” or, as in Wikipedia, “Microwave hearing”). Per an article in *Bioelectromagnetics,* these noises are variably heard with RFR in the 2.4-10.000Hz range30: **“**The sound is similar to other common sounds such as a click, buzz, hiss, knock, or chirp…an individual's ability to hear RFR induced sounds is dependent upon high frequency acoustic hearing in the kHz range above about 5 kHz” and depends on low ambient noise30. Why might sounds reported by diplomats have varied? Different people hear the same RFR frequency differently (if at all): The “fundamental frequency” of the sound does not relate to frequency of the RFR but to head dimensions30. Of note, since **“**The auditory response has been shown to be dependent upon the energy in a single pulse and not on average power density”30, any monitoring for culpable sources must sensitively capture pulsed radiation:

**Health effects of RFR/microwave exposures were well documented (much from Russian and Eastern European literature) by the time of a Naval Medical Research Institute report in 1971,** revised and updated in 1972, with >2300 citations31. “Particular attention was paid to the effects on man of non-ionizing radiation at these frequencies.”**31**. This report included sections on insomnia, headache, fatigue, cognitive problems, and dizziness (among others). Perhaps not coincidentally, such health effects were discussed seriously in the 1971 SETA meeting (Signals and Their Applications), as one who attended that meeting informed me. Before and since, innumerable studies have shown oxidative stress and mitochondrial injury mechanisms14, 31-35 - mechanisms that can produce these widely varying and commonly multiple symptoms – with RFR, including RFR at “low intensities”14. Consistent with this as a mechanism, data show that those with “electrosensitivity”, which most commonly has onset after an RFR exposure, a) are more likely to have gene variants that confer diminished protection against oxidative stress injury36; and b) *consistently* have low levels of melatonin (as indexed by a urinary metabolite related to melatonin)37 - a critical antioxidant known to be vital in defense against damage from radiation in the RFR/ microwave portion of the spectrum38-50, as well as from other types of radiation (ionizing, UV, extremely low frequency, gamma radiation)51-78.

**Scientific “skepticism” is of the industry fueled stripe**79-81 (think tobacco) with mammoth financial interests at play. An analysis by Dr. Henry Lai (U of Washington, now emeritus) found that in non-industry funded studies examining a range of adverse health effects of wireless (RFR) radiation, 28% of industry funded studies, vs 67% of nonindustry funded studies affirmed presence of assessed effects. There was a <1 in 1000 probability the observed effect could have been attributed to chance. A 10 minute review of the decisive impact of conflict of interest on medical information more generally can be viewed here82.

**For diplomats, causative RFR could emanate from communications/monitoring devices, electronic weaponry, or “innocent” sources** – akin to those reported to trigger like symptoms in many nondiplomats. Smaller fractions, but far larger numbers, cite similar effects from legal and increasingly prevalent RFR technologies – in (among other places) the US13, 83, Korea84, Turkey9, Israel85, Australia7, France37, England86, Germany, Italy36, Switzerland11, 87, Austria88, Sweden89, Norway (afflicting Norway’s former 3-time Prime Minister, Gro Harlem Brundtland)90, 91, Finland (e.g. former Nokia technology chief Matti Niemela92) -- and Canada, where Frank Clegg, former head of Microsoft Canada - now head of Canadians for Safe Technology, C4ST - leads the effort toward recognition88.

**Russians had reportedly radiated the US embassy in Moscow from 1953-1976, using microwave radiation, sickening embassy staff** according toformer Canadian electronics warfare officer, Capt. James G. (“Jerry”) Flynn (Ret), who spent 22 years in Electronic Warfare and Signals Intelligence (SIGINT) including two years in National Defense Headquarters (NDHQ) Ottawa, in the Directorate of Electronic Warfare (DEW)**,** in a briefing to journalists in 201693. The facts of the Moscow case are beyond my sphere of expertise, and I had drafted all but this paragraph prior to encountering that claim. The parallels between conclusions for Cuba, independently driven by evidence, and circumstance he reported for Moscow-based US diplomats, dictate inclusion.

**The RFR “hypothesis” makes predictions**. Among these: Some among those affected will report new intolerance to sources of RFR and perhaps non-RFR radiation (such as some power lines) – with which they previously had no problem. And, effective shielding for RFR in diplomats’ homes and offices should reduce occurrence in those deployed to Cuba in future.

It may be hoped that attention to the problem in Cuban diplomats can bolster recognition for the many others afflicted by similar problems of varying severity. Meanwhile, the substantial research already showing compatible health effects of RFR may inform those caring for Cuban diplomats, and those in pursuit of causative devices.

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