

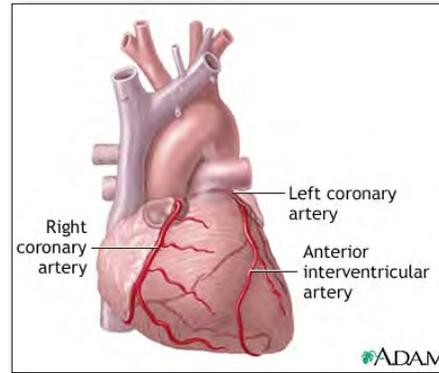
Heart Rate Variability (HRV) as a Diagnostic Tool in Electrohypersensitivity (EHS)



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Electrohypersensitivity & Heart Problems

Heart



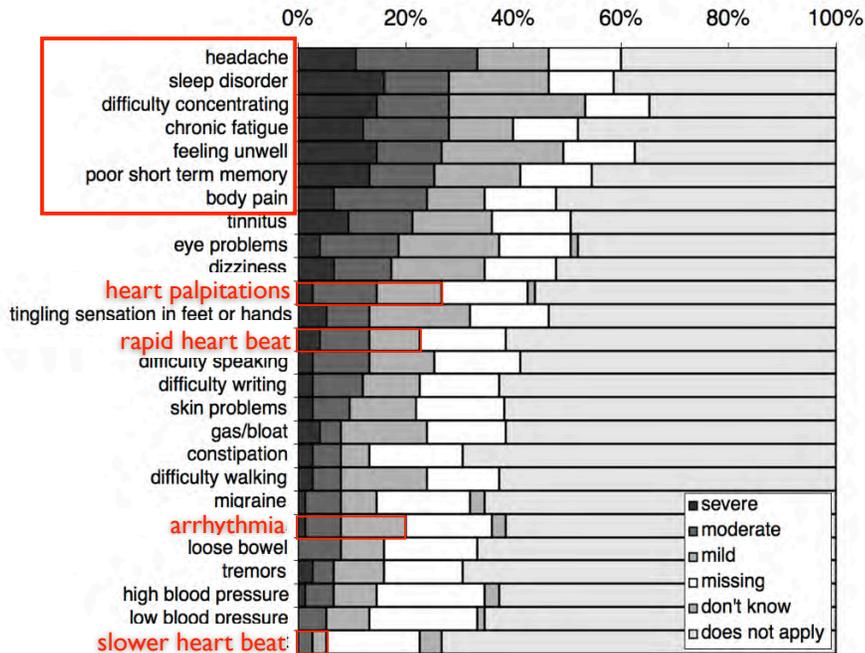
palpitations

arrhythmias

low or high blood pressure

pain or pressure in the chest

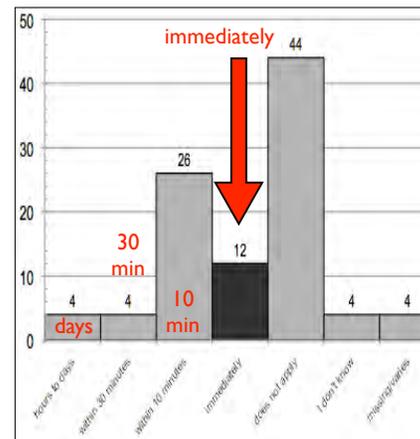
Severity of Symptoms (n=75)



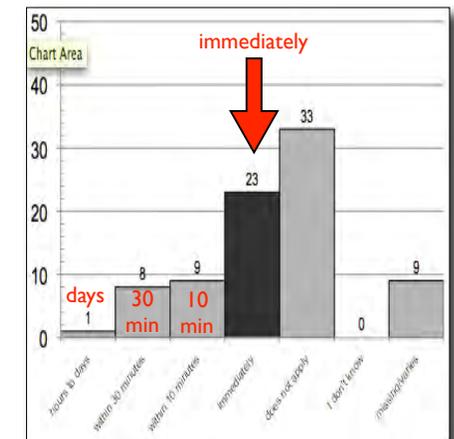
Self-proclaimed electrosensitivity of participants.

How quickly do you RESPOND?

First Study: (n=25)



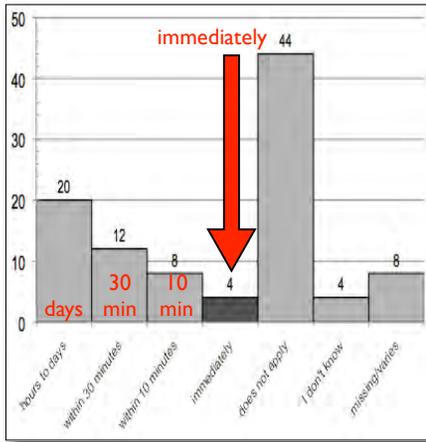
Second Study: (n=75)



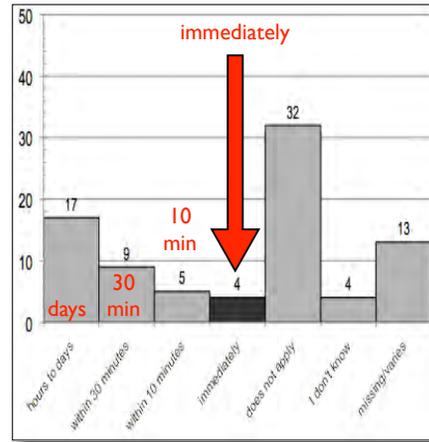
Self-proclaimed electrosensitivity of participants.

How quickly do you RECOVER?

First Study: (n=25)

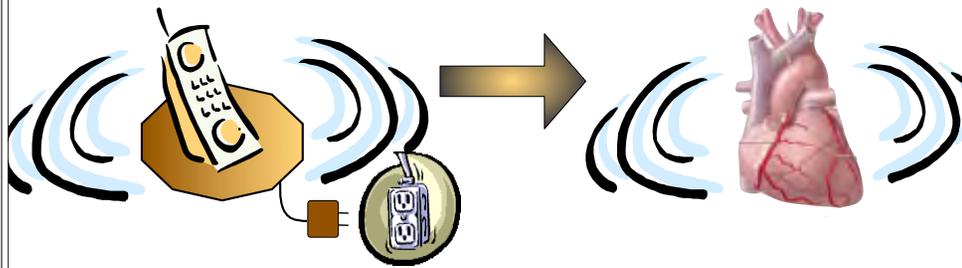


Second Study: (n=75)



"Proof of Concept" Provocation Study

Do cordless phones affect the heart?



	ICNIRP/US/Canadian Guideline	Cordless Phone
0.3% frequency (GHz):	2.4	2.4
intensity (microW/cm ²):	1000 (540)	3

rhythmograph

Time between beats

60 bpm

1 sec

slower

faster

~100 cm

sham exposure

live

dead

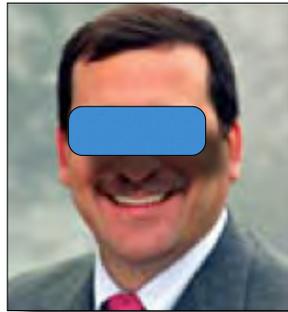
receiver

electrode belt with transmitter

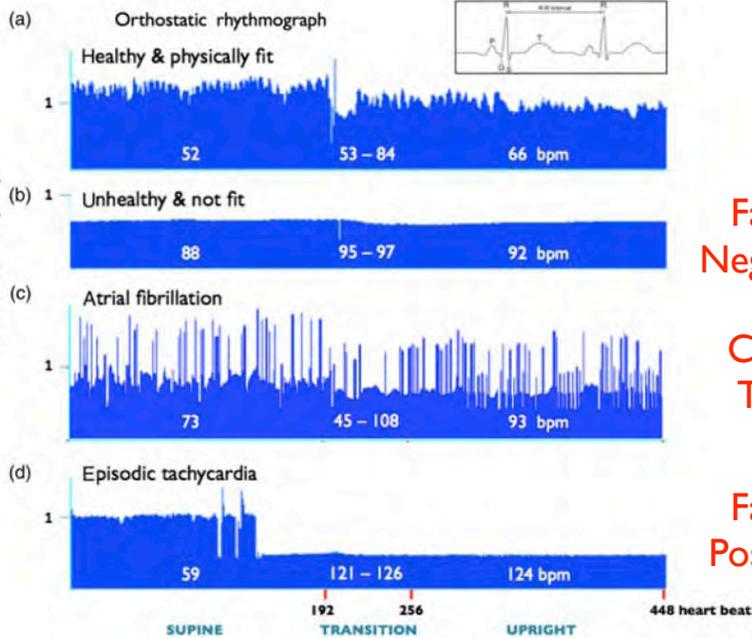
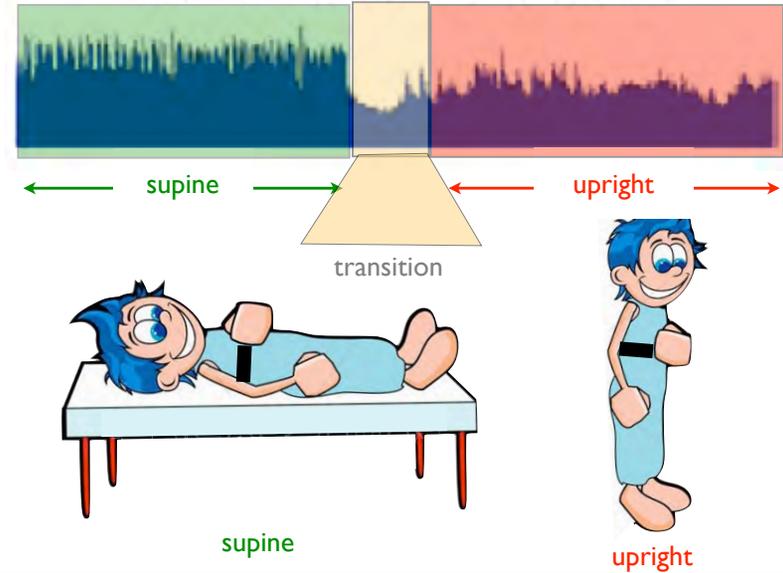
Double Blind Study



Dr. Jeff Marrongelle



Orthostatic Test Professional athlete



False Negative

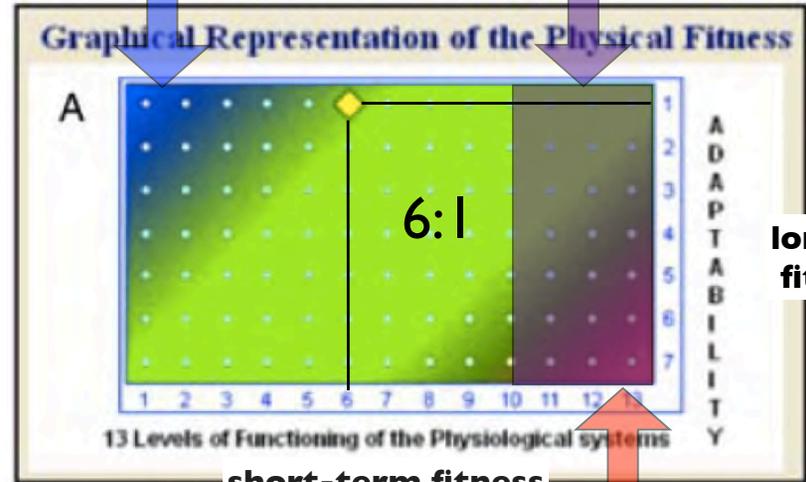
Can't Test

False Positive

Figure 1. Examples of the Nerve Express orthostatic rhythmograph for different conditions.

top athletes

fatigue



long-term fitness

short-term fitness

chronically ill

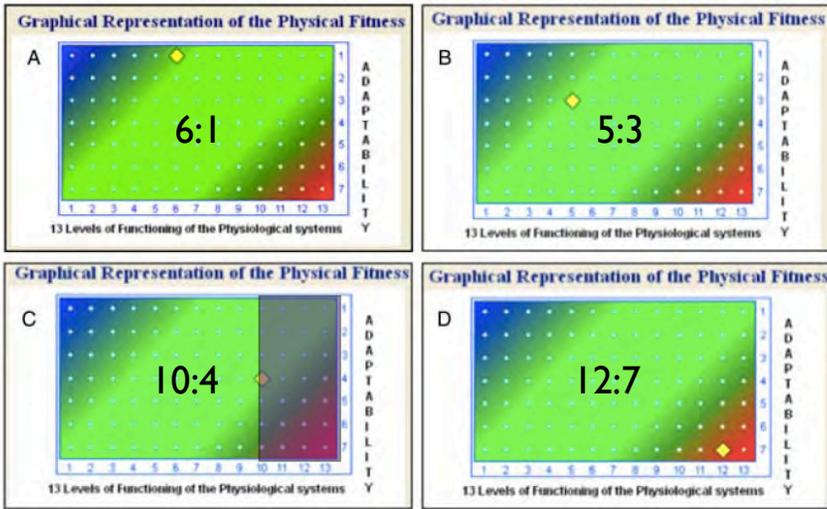
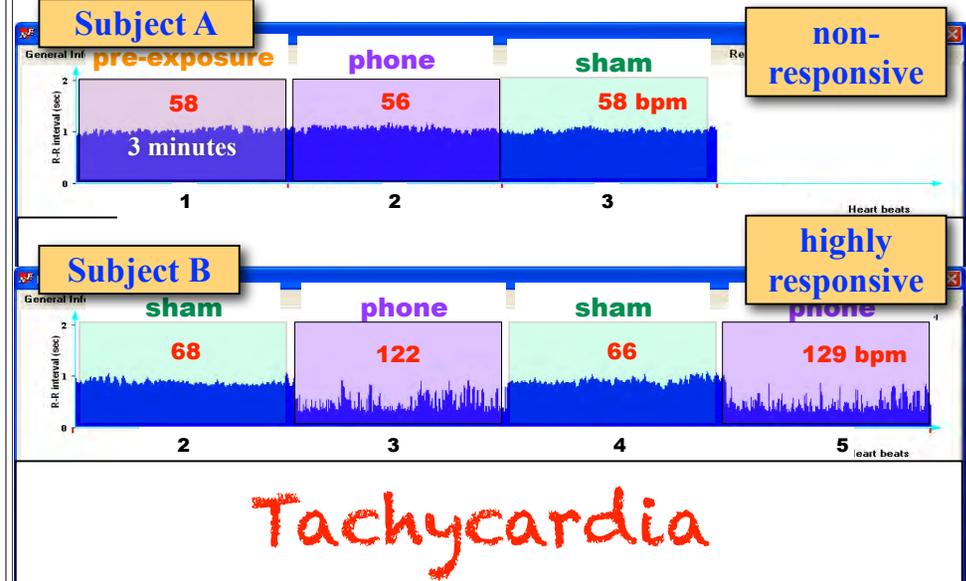


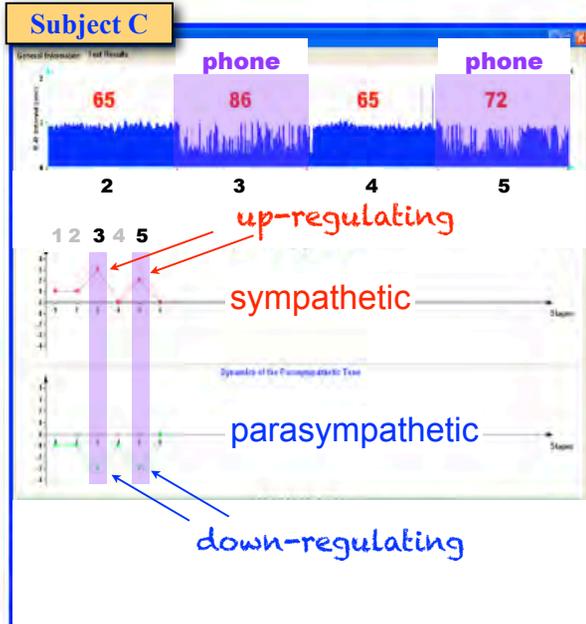
Figure 3. Physical fitness based on the orthostatic test. Fitness decreases as one approaches the lower right corner of the graph. A fitness score at and above 10 (horizontal axis) indicates fatigue. The relative fitness of the four examples decreases from A (6-1) to D (12-7).

Continuous monitoring of heart digital cordless phone provocation

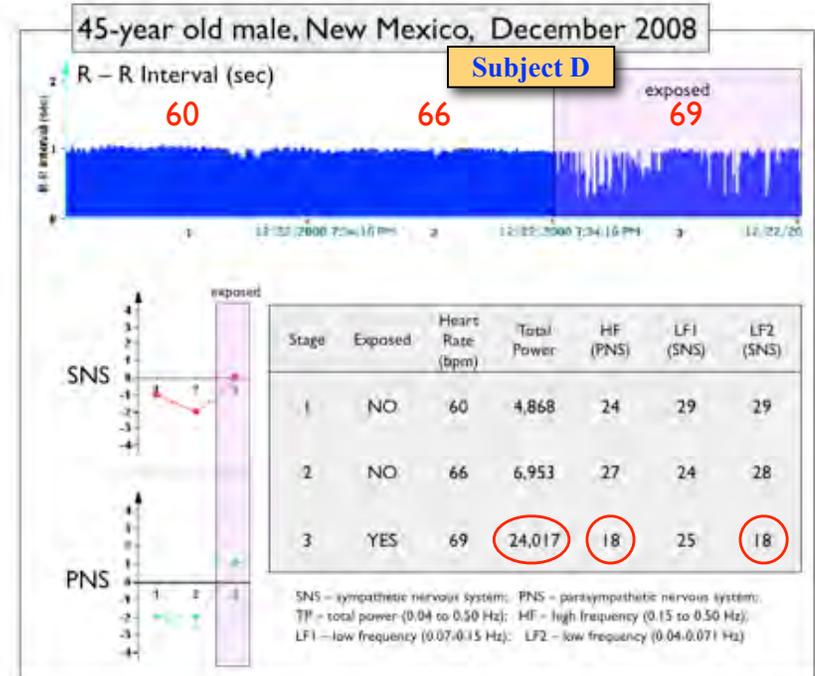


Real Time Monitoring Subject C: Reactive

Gender: Female
Age: 56 years
Height: 5'6"
Weight: 156 lbs
Blood Type: O+
Sitting HR: 66
Blood Pressure: 123-76
Blood Sugar: 5.0 mmol/L
Time Since Last Meal: 0.5 hr



"fight or flight"
stress response



Is this person EHS?

False Negative Response

Can't tell due to adrenal exhaustion.

Non-reactive subject with dysautonomia & adrenal exhaustions: EHS unknown

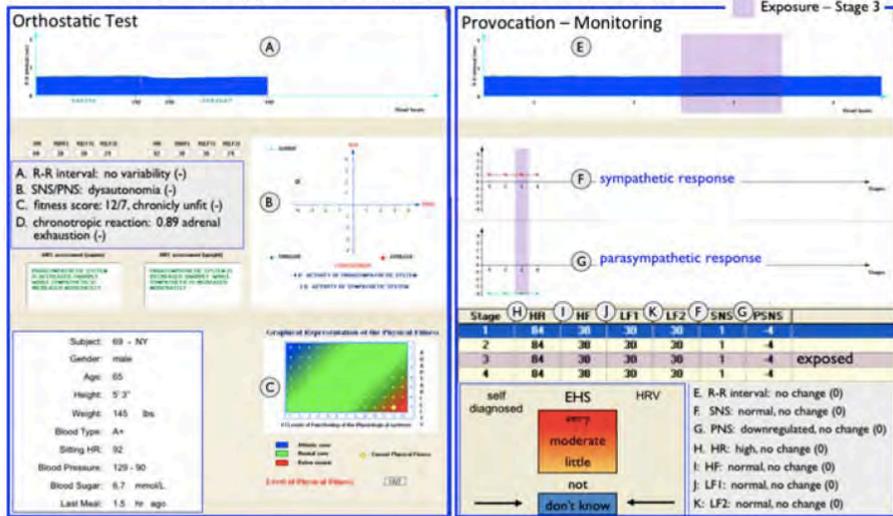


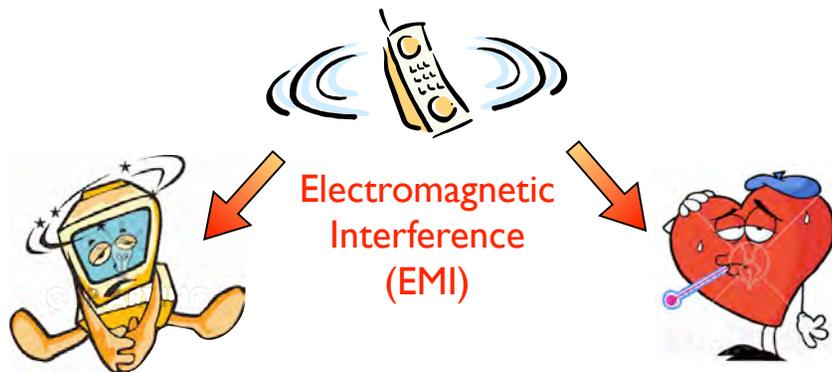
Figure 6. HRV parameters for a subject with dysautonomia and adrenal exhaustion who is not responding to any exposure. This subject's electrical hypersensitivity was classified as unknown due to adrenal exhaustion.

Subject E

Question:

Are the results **real** or are they an **artifact** due to **electromagnetic interference (EMI)**?

Was the **radiation** from the **cordless phone** interfering with the **receiver** and giving a **false reading** or was it interfering with the **heart**?

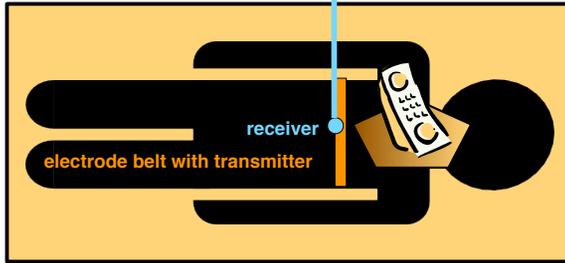


Test for Interference

Exposure Protocol cordless phone & heart

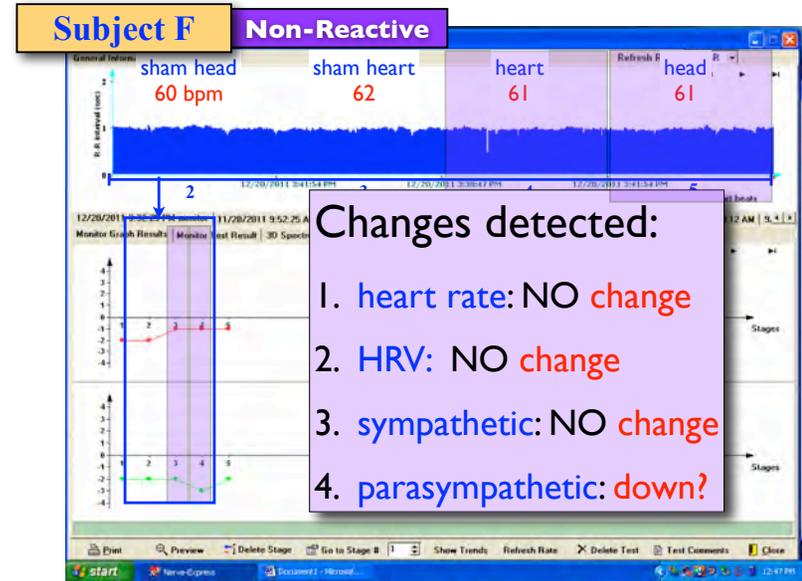


PHONE NEAR	DISTANCE from receiver (cm)	RADIATION at receiver ($\mu\text{W}/\text{cm}^2$)
HEAD	80 - 110	2 - 3
HEART	~ 5	100 - 200



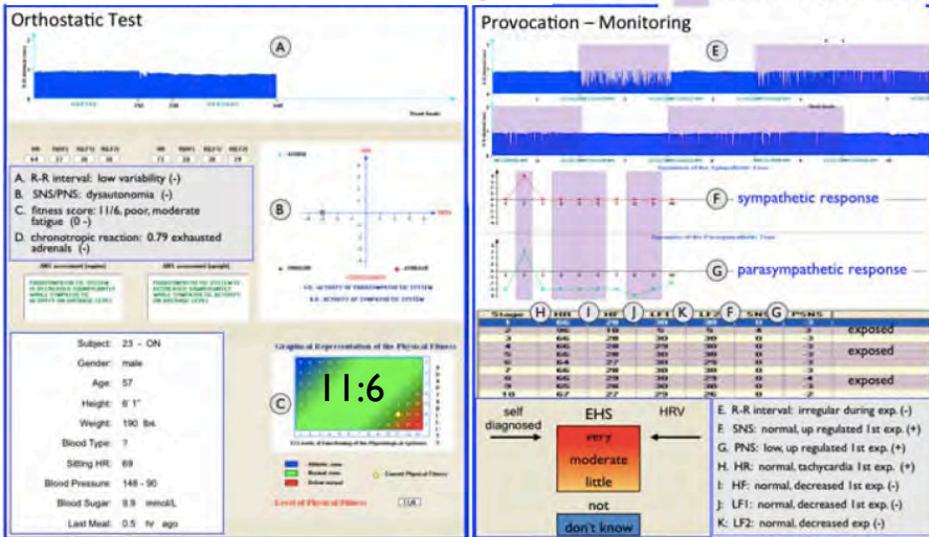
3

Female-50s: HRV does not react to 2.4 GHz [December, 2011]



Subject G

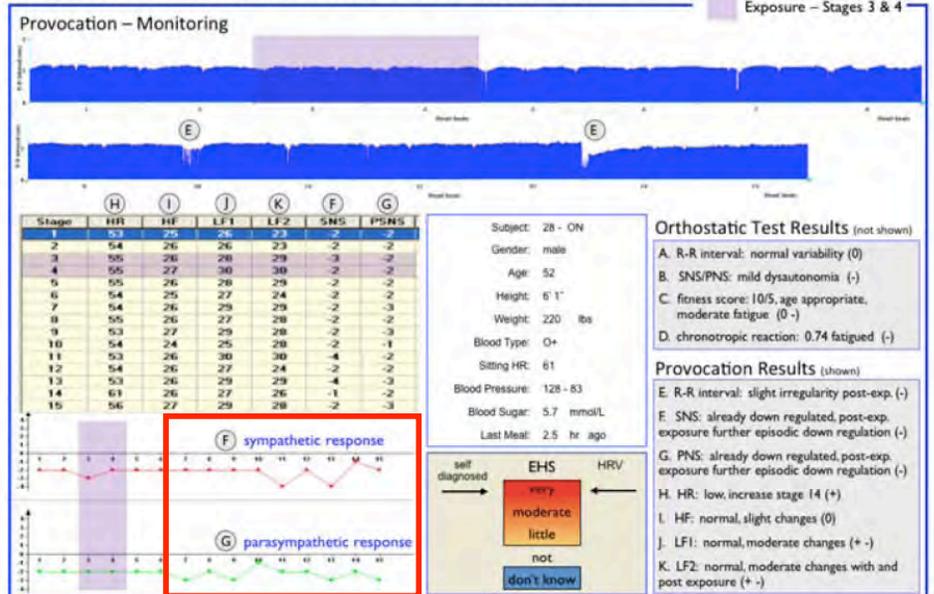
Subject with moderate fatigue



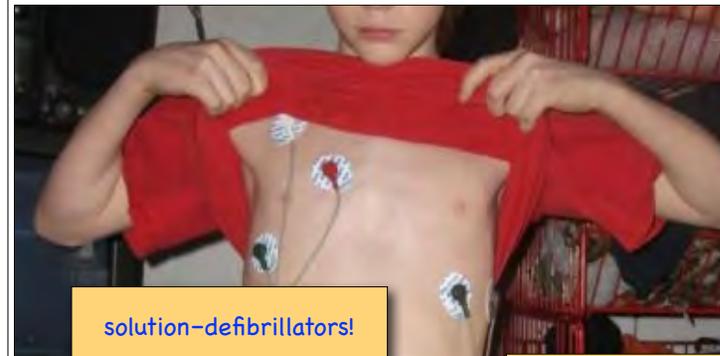
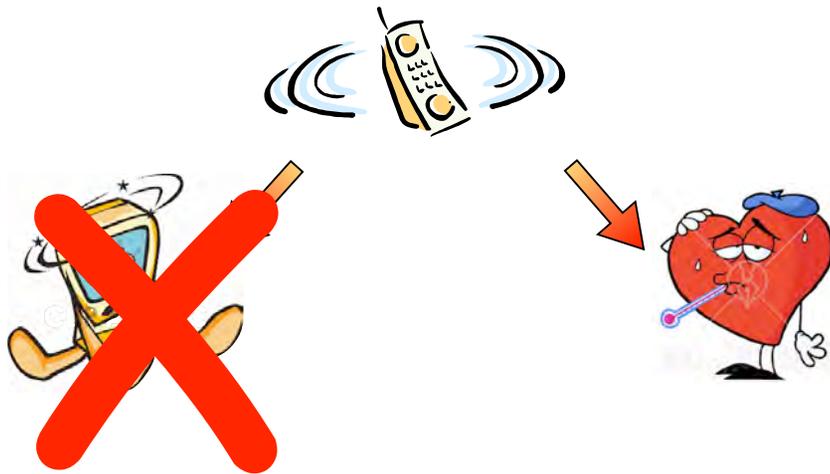
Delayed Reaction

Subject H

Delayed reaction, healthy subject with moderate fatigue: very EHS



Interference?



Student with Heart Monitor

solution—defibrillators!

Mountain View School: Wi-Fi

1. 6-year old girl, "musical heart", headaches, dizziness only at school.
2. 12-year old boy, tachyardia.
3. 12-year old girl, nausea, vomiting, no fever, insomnia, blurred vision, tachycardia (only at school).
4. 13-year old boy, heart pounding, insomnia, headaches, moved & symptoms abated.

- in Simcoe County, 4 students experienced sudden cardiac arrest in the past school year (2 died)
- incidence of adolescent cardiac arrest is 40 x higher than the expected national average
- youngest child - 13 years old

Source: www.safeschool.ca

Biological Effects and Health Implications of Microwave Radiation

Symposium Proceedings

Richmond, Virginia, September 17-19, 1969

Edited by
3rd (Stephen F. Cleary, ed.)
Department of Biophysics
Virginia Commonwealth University

1969

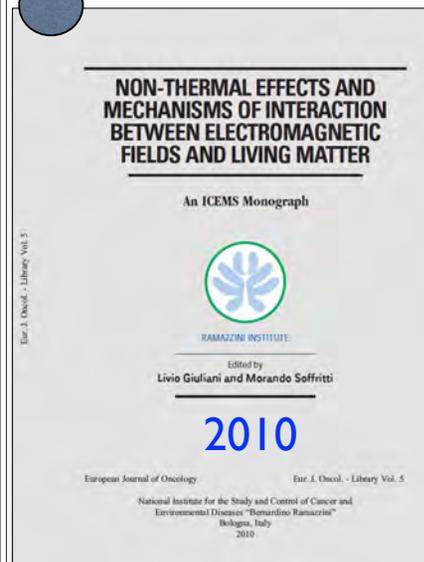


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In the interest of occupational hygiene . . . investigators have recommended that **cardio-vascular abnormalities** be used as **screening criteria to exclude people from occupations involving radio-frequency exposures.**

Students need to be to screened at school to ensure that they do not have an underlying heart condition that may be exacerbated with Wi-Fi exposure.

ICEMS: The International Commission for Electromagnetic Safety



Provocation study using heart rate variability shows microwave radiation from 2.4 GHz cordless phone affects autonomic nervous system

Magda Havas, Jeffrey Marrongelle, Bernard Pollner, Elizabeth Kelley, Camilla R.G. Rees, and Lisa Tully

Abstract

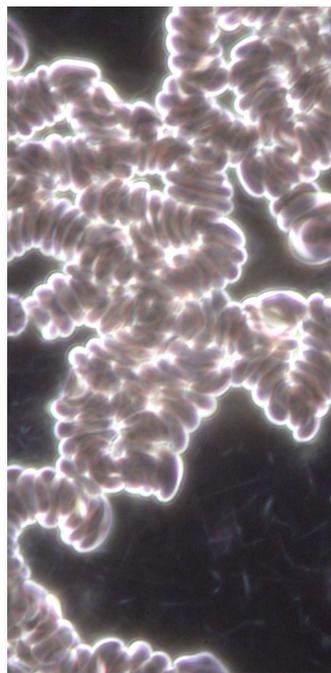
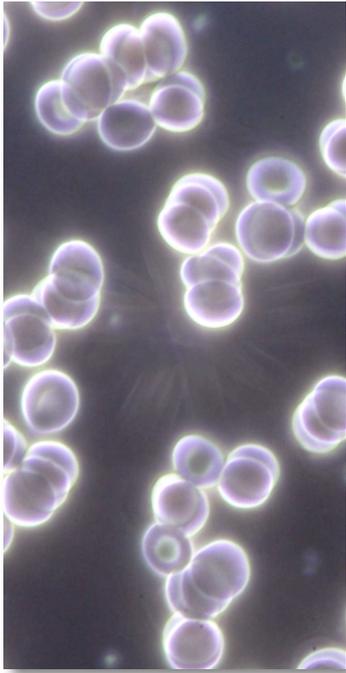
Aim: The effect of pulsed (100 Hz) microwave (MW) radiation on heart rate variability (HRV) was tested in a double blind study.

Materials and Methods: Twenty-five subjects in Colorado between the ages of 37 to 79 completed an electropersensitivity (EHS) questionnaire. After recording their orthostatic HRV, we did continuous real-time monitoring of HRV in a provocation study, where supine subjects were exposed for 3-minute intervals to radiation generated by a cordless phone at 2.4 GHz or to sham exposure.

Results: Questionnaire: Based on self-assessments, participants classified themselves as extremely electrically sensitive (24%), moderately (16%), slightly (16%), not sensitive (8%) or with no opinion (36%) about their sensitivity. The top 10 symptoms experienced by those claiming to be sensitive include memory problems, difficulty concentrating, eye problems, sleep disorder, feeling unwell, headache, dizziness, tinnitus, chronic fatigue, and heart palpitations. The five most common objects allegedly causing sensitivity were fluorescent lights, antennas, cell phones, Wi-Fi, and cordless phones.

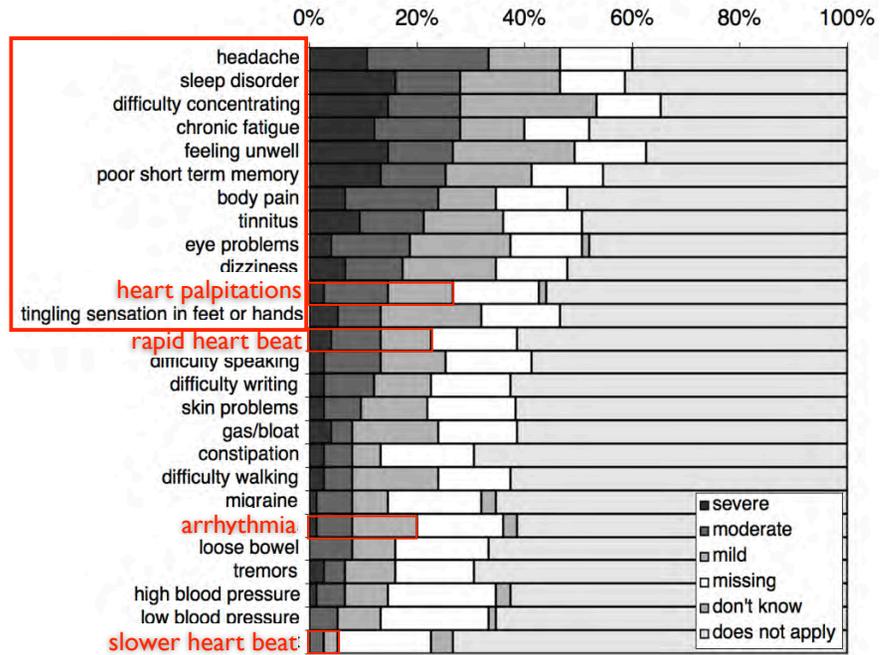
Provocation Experiment: Forty percent of the subjects experienced some changes in their HRV attributable to digitally pulsed (100 Hz) MW radiation. For some the response was extreme (tachycardia), for others moderate to mild (changes in sympathetic nervous system and/or parasympathetic nervous system), and for some there was no observable reaction either because of high adaptive capacity or because of systemic neurovegetative exhaustion.

Conclusions: Orthostatic HRV combined with provocation testing may provide a diagnostic test for some EHS sufferers when they are exposed to electromagnetic emitting devices. This is the first study that documents immediate and dramatic changes in both Heart Rate (HR) and HR variability (HRV) associated with MW exposure at levels well below (0.5%) federal guidelines in Canada and the United States (1000 µW/cm²).



Wi-Fi & Blood

Severity of Symptoms (n=75)



Wi-Fi & Plant Growth



Thank You!

www.magdahavas.com