COMMONWEALTH OF MASSACHUSETTS

Berkshire, SS.

SUPERIOR COURT DEPARTMENT
OF THE TRIAL COURT
C. A. NO. 2381-CV-00326

Courtney Giraldi et al,
Plaintiffs

v.

Linda Tyer et al,
Defendants

Amicus Curiae Brief
in Support of Plaintiff's Opposition to the Renewed Motion of Defendant to Dismiss

In Support of the Plaintiff's Opposition to the Renewed Motion of Defendant to Dismiss, Paul Héroux, by Neil J Berman, Esq., submits the article below, written to reveal the improper measurement used by the telecommunications industry to label as safe the impact of cellular phone towers, which is an issue of probative value concerning this matter.

The Collision between Wireless and Biology
by Paul Héroux, PhD

A measurement called Specific Absorption Rate (SAR) is currently used in the telecommunications industry to evaluate the health impacts of cellular phones. SAR is a measure of the rate of heat injection into living tissues in units of Watts per gram of tissue. In these measurements, human tissues are simulated using a solution of sugar (45-56%), water (40.4-52.5%) and salt (1.4-2.5%) (FCC 1997). Basically, if the heat injected by the phone does not heat this solution, which represents the brain, by more than one degree Celsius, the phone is labeled as "safe".

Cellular phone towers are evaluated for safety using the same heat-based philosophy, but applied to the whole body instead of to small cubes of tissue (1 or 10 g).

Unfortunately, some important characteristics of living tissues are left out of the safety evaluations (SAR) of cell phones and cell phone towers.

The first aspect is that living tissues are metabolically active, contrary to the sugar/water/salt solution. Living tissues use food and the oxygen we breathe as a power source to produce the energy that we

need to move, think, grow, and repair tissue damage. This living process is based on chemical reactions that move electrons through a path called “electron transport chain”. As electrons move from food to oxygen, they create a series of ionizations, and some of the electrons escape from the process, leading to the appearance of reactive radicals widely known as “Reactive Oxygen Species” or ROS for short (as described in 1944 by Schrödinger as "negentropy"; Schrödinger, republication 2010).

What this means is that there is continuous electrical activity happening within living tissues completely independently from any energy that would be contributed by Non-Thermal Electromagnetic Radiation (NTER). In terms of creating electrical activity, living tissues take matters into their own hands, so to speak, and are continuously pushing through electrons that allow them to stay alive.

The electron transport chain is at the root of a process distributing the energy it provides to all corners of living cells. It does so by generating a current of protons that are used to create molecules of adenosine triphosphate (ATP) from molecules of adenosine diphosphate, and distributing ATP everywhere within the cell. Molecules of ATP allow cells and the whole organism to run, the same way that dollars make the US economy possible, and that Congress appropriates funds. If the production of ATP stops for a moment, the cell, tissue, and organism are in peril. This is what happens when blood flow and its oxygen are interrupted to the brain. We lose consciousness within seconds and die within minutes.

This description of the metabolism of all life forms brings us to the conclusion that continuous flows of electrons and protons are critical to living systems, but are not represented in any way in the SAR tests on a sugar/water/salt solution. This view of metabolism is so central and accepted in biology that many Nobel prizes have been given to those who uncovered the process (Warburg 1931; Krebs 1953; Boyer, 1997).

The second aspect of living tissues that is left out of the SAR testing procedures is the presence of receiving antennas in living tissues that react to electromagnetic radiation. In the implementation of the electrons and proton transport chains, biology has chosen to extend the travel of electrons and protons considerably, from the approximately 0.1 nanometers (10^{-9} meters or nm) typical of inorganic reactions to 150 nm (Hirst 2018). This makes the travel about 200 times longer. The pattern of the electron and proton currents within the ATP production unit contained within the mitochondria of cells in shown in Figure 1.

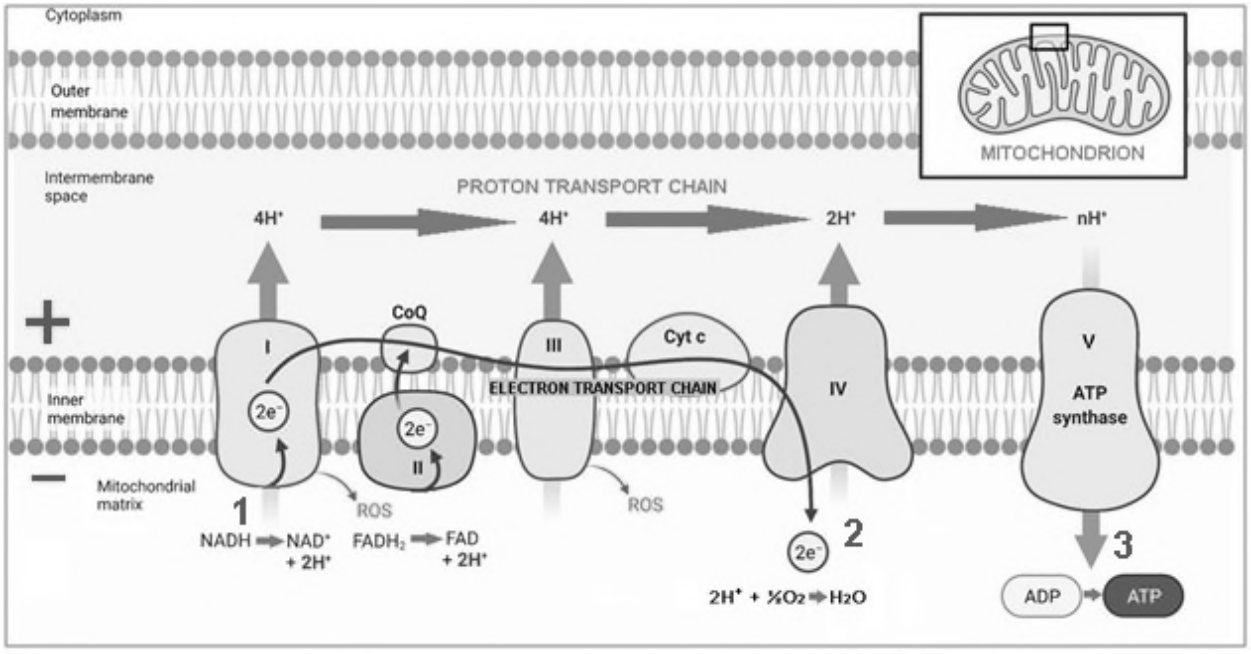

Figure 1. Electron and proton currents are traced in black and blue, respectively, within the oxydative phosphorylation chain. Molecular Complexes are labeled with black Roman numerals (I to V).

Any flowing current, including the electrons or protons currents represented in Figure 1, can be disturbed by external electromagnetic fields, whatever their intensity, from the principle of superposition.
Since there is an electromagnetic field driving the electron and proton currents, this field will be perturbed by electromagnetic radiation coming from outside, specifically by radiation emitted by a cell phone tower.
It should be mentioned that the fields emitted by cell phone towers, a succession of brief pulses (LTE frame at 0.01 sec) are entirely different in their shock value from any natural fields normally present in the body, causing ripples in the natural fields (the static field of the Earth or the slowly changing mitochondrial membrane potential) present in the body.

One last aspect worthy of mention is that although the electron and proton transport chains are physically minuscule, there are an incredible number of them in the body (see Table 1), specifically between 0.28 and 18 quintillions, their density depending on the location. This is why living tissues have some characteristics of metals.

Table 1. There are many cells in the human body, there are many mitochondria per cell, and there are many oxydative phosphorylation chains per mitochondrion. The total length of active currents that can be influenced by Non-Thermal Electromagnetic Radiation is therefore considerable.

Cells in human body	Mitochondria per cell	ATP Synthase molecules per mitochondrion	Number of 150 nm Conductors (Cells x Mito x ATPS) in human body

36×10^{12} (male) 28×10^{12} (female)	100[1]	100-5,000[2]	280,000,000,000,000,000 to 18,000,000,000,000,000,000
Total Receiving Antenna Length = 4.2-270 10^{7} km			

[1] 5 for sperm; 200 for skin; 1,000-2,000 for liver; 1,600 for small intestine; 1,700 for muscle; 5,000 for heart muscle; 600,000 for human egg; 2,000,000 for brain cell. See Figure 3.

[2] Counting only active ATPS; total ATPS can be up to 100 times higher (Fahimi 2021).

These innumerable electronic and protonic currents flowing in the human body act as receiving antennas, and will inevitably be targets of Non-Thermal Electromagnetic Radiation (NTER).

It should be noted that all NTER is capable of interaction with metabolism. However, 3 billion years of evolution have done a fairly good job of rendering living systems relatively immune from the radiation from our Sun and from the Earth's static magnetic field. In fact, this immunity is not complete, as we still sunburn and get cancer from ultra-violet radiation, and a favorite model of biologists, the fruit fly (*Drosophila melanogaster*), is far healthier under dark conditions, all other visible colors shortening life-span and locomotor activity by as much as 40% (Krittika 2022). Adverse cardiovascular outcomes have been linked to changes of 10 nT, 0.03% of the Earth's static field (Zilli Vieira 2022).

But the levels of NTER from wireless techniques that we are experiencing now are totally unprecedented, and living systems have no defense against this new arrival (Bandara 2018).

One last warning. NTER acts on living tissues in great part through the mitochondria within cells. These organelles are the seat of energy generation for living systems. Furthermore, the 13 genes resident in mitochondria are described as the mitochondrial time clock, because this is where mutations accumulate the fastest in human genetics (Cabrera 2021). These genes are susceptible to anomalous environmental influences, and it is not clear that perturbations to metabolism over long periods are genetically reversible. Applied to reproductive tissues, basic mechanisms of biological efficiency could be undermined, resulting in irreversible devolution (as opposed to evolution).
Challenging the very basic process powering biological systems is a dangerous game. "Tamper with this reaction at your peril." (Lane, 2015; evolutionary biochemist and winner of the 2015 Biochemical Society Award).

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