

Cellular Respiration Oxidation Reduction Reactions Electromagnetic Fields Emissions as Possible Causative Agent in Diseases: A Chronic Bombardment Theory

Abraham A. Embi*

Departamento de Parasitología, Laboratorio Centro Médico, Bauta, Habana, Cuba

Abstract

The fundamental mechanisms and consequences underlining the interchange of electromagnetic forces (EMFs) within a living organism have received little attention. In this manuscript we are presenting for the first time evidence of EMFs emissions attributed to the enzyme catalase, either alone or associated with H_2O_2 breakdown in oxidation–reduction (Redox) reactions during cellular respiration. Using the human hair follicle as sentinels, *in vitro* exposure of freshly plucked *ex vivo* human periumbilical hairs were indirectly exposed through a glass barrier to powder catalase and continuous (Redox) reactions triggered in a processed meat sample. In both instances EMFs were detected and shown causing metabolic changes in the human hair as well as a disruption of the crystallization process of a Prussian Blue- iron nanoparticles solution (PBS Fe 2K). We hypothesize that due to the presence of chronic internally emitted EMFs during cell respiration, there exists a propitious niche for cellular genetic changes that could lead to DNA damage and its consequences. Cellular respiration is essential for survival and Redox reactions are viewed also as an essential friend that neutralizes toxic substances. We hypothesize that it could it also be a foe by its intrinsic continuous EMFs emissions.

Keywords

Cellular Respiration, Internal EMFs, Oncogenesis, Catalase, Biomagnetism, Iron Nanoparticles Solution, Cancer Factor, Processed Meats

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1. Introduction

The fundamental mechanisms and consequences underlining the interchange of electromagnetic forces (EMFs) within a living organism have received little attention. In this manuscript we are presenting for the first time evidence of EMFs emissions when the enzyme catalase is present, either alone or associated with the H_2O_2 breakdown in oxidation–reduction (Redox) reactions present during cellular respiration. Glass slides were prepared by using a novel and simplified method for imaging EMFs in plant an animal tissue [1]. To view the images, an optical microscope was

used in conjunction with a solution of Prussian Blue Stain and iron nanoparticles (PBS Fe 2K). This approach had been previously tested demonstrated by the finding of inherent biomagnetism of human hair follicles [2]. The cellular respiration metabolic process involves the electron transport chain, creating electron movement within cells. As inferred by Faraday's law, electron movement within a living cell will induce an electromagnetic field (EMF) acting as electrical conductors. The implications of the findings that the Redox reactions are EMFs generators are presented and proposed in the context of being a possible factor contributing to the correlations found in DNA damage and oxidant-antioxidant status in blood of patients with some cancers [3].

* Corresponding author

E-mail address: embi21@att.net

2. Materials and Methods

A solution was prepared by mixing one part of Potassium Ferriyanide one part of HCL 2.5% and two parts of a solution containing the nano-sized iron particles, mean diameter 2000 nanometers (Fe2K). The combined solution will be referred to as (PBSFe2K) throughout the text, where PBS=Prussian Blue Stain and Fe2K= Iron particles with 2K indicating 2000 nanometers in diameter.

- The Single Slide Preparation (SSP)

Human hairs were plucked by forceps. The hair was placed in the center of a standard glass slide. One or two drops of the PBSFe2K solution were placed to cover the follicle and adjacent shaft area with the liquid (n=10). After the liquid evaporated the SSP was then viewed in the normal mode at X10 and/or 40X magnification with a video microscope (Celestron. LCD Digital Microscope II model #44341 Torrance California USA).

- The Two Slide “Sandwich” Preparation (SDW)

Whenever material is trapped between two slides will be dubbed a sandwich (SDW).

- Slide assembly to detect the Catalase EMFs.

Powder catalase was evenly and thinly smeared on a clean 25x75x1mm slide. Human hairs were placed in the center of a second slide covering the first, thus creating a SDW. One or two drops of PBSFe2K delivered covering the hair follicle, thus creating a SSP. These slides were allowed to stand until the on the top slide had essentially dried (3 hours). The specimens were then examined under an optical microscope at 10X or 40X magnification. Microphotographs and video recordings were made of selected examples.

- Powder catalase experiments preparation details:

I) Experiment # 1, n=6

Powder catalase as EMFs generator:

Human abdominal hairs were placed in the center of a 25x75x1mm glass slide. Powder catalase was thinly smeared on a second slide. Care was taken to avoid large air gaps and the first slide was then placed over the catalase laden one, thus creating a sandwich (SDW). One drop of PBSFe2K was delivered to cover the hair follicle.

II) Experiment # 2, n=6

Controls:

Human abdominal hairs n=6 were also placed in the center of a 25x75x1mm slide. One drop of the PBSFe2K solution was also delivered covering the follicle allowed evaporating.

III) Experiment # 3, n=2

H₂O₂ breakdown (Redox Reaction) using processed meat as EMFs generator:

A fragment of processed meat (Genoa Salami) was placed in the center of a clean 25 x 75 x 1mm glass slide. Two small drops of a commercially available 3% Hydrogen Peroxide (H₂O₂) were placed covering the meat sample. The first slide containing the processed meat was covered by a similar second 25x75x1mm slide, thus creating a SDW and one drop of PBSFe2K was delivered covering the hair follicle placed on the second slide, thus creating a (SSP). An Oxidation-Reduction reaction (Redox) immediately ensued; bubbling was seen generated by the breakdown of the H₂O₂ molecule caused by the interaction with the enzyme catalase. This was apparent by the chaotic bubbling intensity and average duration of > 1 hour.

For all three experiments, during and after evaporation of the PBS Fe2K solution images were viewed and still pictures or videos were recorded in the normal mode at X4 magnification with a video microscope (Celestron LCD Digital Microscope II model #44341 Torrance California USA).

3. Results

I) Experiment # 1. Powder catalase as EMFs generator:

When the hair follicle is placed on the top surface of a SDW containing powder catalase, the SSP on the top slide shows an absence of large crystals surrounding the follicle (Fig 1). We attribute this inhibition in crystallization to a clash between opposing magnetic forces in a diamagnetic environment (SSP PBSFe2K) as indicated by previous research Furthermore as previously described, EMFs from living biological tissue could penetrate through glass barriers [4].

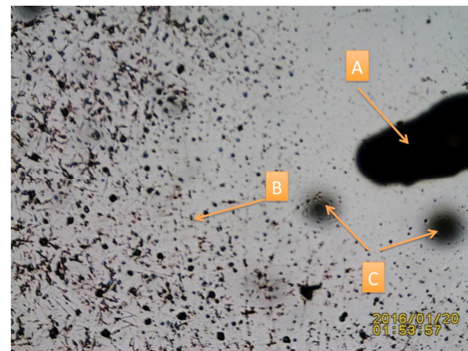


Figure 1. (SDW1) SSP PBS Fe2 4K of hair follicle showing a stark reduced electrobiomagnetism when compared to Figure 2. This change is attributed to the powdered catalase in SDW vertical EMFs emitted through a 1 mm glass barrier. A= Follicle B= Iron particles and C= Out of focus catalase powder grains in the SDW (different plane).

II) Experiment # 2. Controls:

When the hair follicle is not subjected to external EMFs,

there are numerous crystals surrounding the follicle in the evaporated SSP PBSFe2K. This phenomenon had been previously associated with living tissue metabolism, See introduction and (Fig 2).

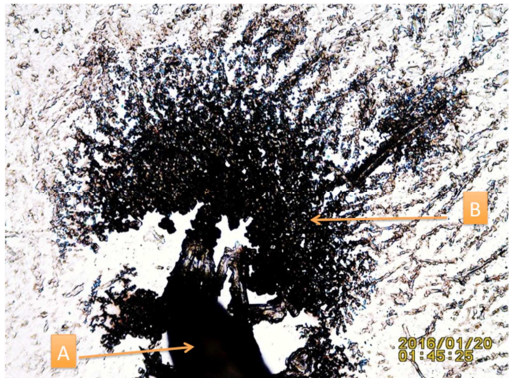


Figure 2. (SDW1) No catalase under the SSP PBS Fe2 4K. Scalp hair follicle control- A= Hair Follicle B- Notice iron particles surrounding the hair follicle. These particles are attracted due to the intrinsic biomagnetic forces of the human hair follicle.

III) Experiment # 3. H₂O₂ breakdown (Redox Reaction) as EMFs generator:

When processed meat samples are covered with H₂O₂ in a SD, bubbling ensues. The trapped H₂O₂ breakdown emits EMFs that penetrated through a 0.017 mm coverslip glass barrier. These unseen forces were recorded as influencing and changing the evaporation/crystallization patterns of the PBSFe2 2K (Figures 3,4 and 5)

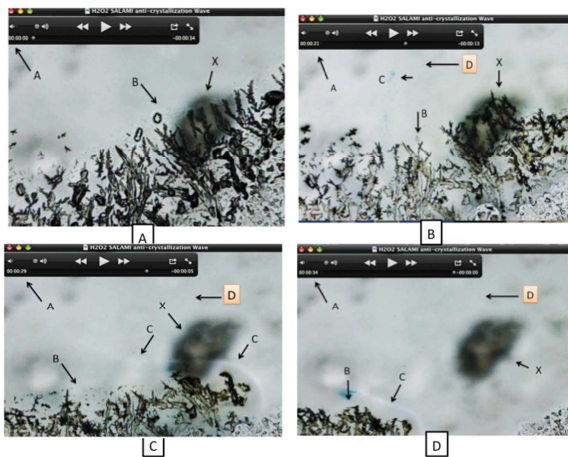


Figure 3. Panel showing crystals displacement by EMFs in a video recording from breakdown of H₂O₂ by catalase (ROS reaction) in SDW. In all panels left upper arrow pointing at recording time. For panel A= 0.00 seconds (s) B= 0.21 s C= 0.29 s and D= 0.34 s.

In all panels: D= Direction of the right to left fluid displacement by EMFs. X= Out of focus salami material in SDW.

Notice in al panels. B= Crystals disintegrating by fluid wave “C”= Advancing fluid wave

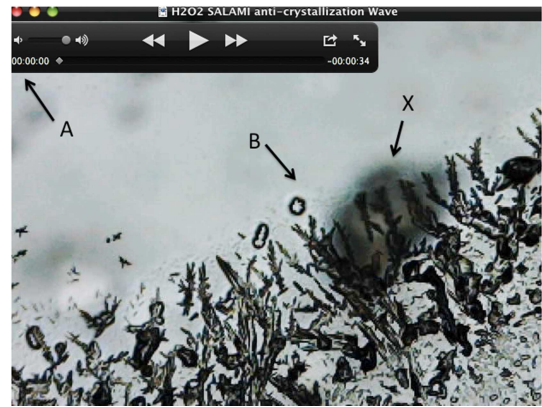


Figure 4. Magnified panel A in figure 3: SDW trapping H₂O₂ breakdown by catalase, Photograph of top slide showing beginning video frame of SSP PBS FE2 2K.

A= Beginning recording time (0.00 seconds) B= Evaporation line X= Out of focus shadow from material trapped in SDW (Salami).

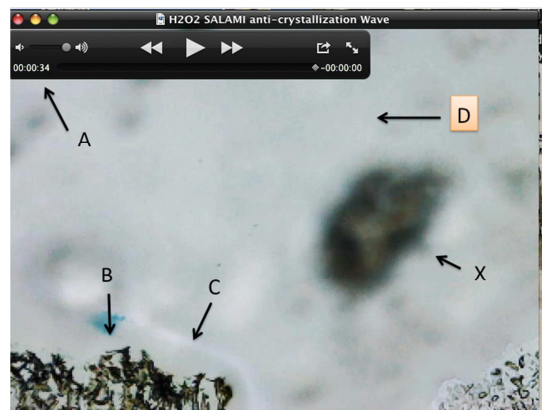


Figure 5. Magnified panel D in Figure 3. Showing advancing fluid wave from H₂O₂ breakdown in SDW effect on evaporation line of SSP PBS Fe2 2K.

A= Recording time (34 seconds) B= Crystals disintegrating in evaporation line C= Advancing fluid wave outline D= Displaced fluid direction X= Out of focus salami material in SDW. Compared with Figure 1 movement not influenced by H₂O₂ breakdown.

4. Discussion

As per our previous research and using hair follicles, iron laden dendrite crystals were seen attracted towards the human hair, rat whiskers [5], inanimate magnets and living plants reproductive organs and leaves [6]; furthermore as aforementioned, we have also demonstrated the property of the hair biomagnetic forces able to penetrate through glass barriers [4]. In this presentation we are reporting two different experiments, the first showing intrinsic EMFs (emitted by the enzyme catalase proper in a powder form) penetrating through a glass barrier and its effect on the

human hair follicle metabolism. The second are the EMFs generated by the Redox reaction caused by the immediate breakdown of H_2O_2 by catalase in a processed meat sample and its effect on fluid dynamics and crystallization of a SSP PBS Fe₂K during evaporation.

The human hair as sentinels:

Using the human hair follicle as sentinels, the *in vitro* exposure of freshly plucked *ex vivo* human peri-umbilical hairs were indirectly exposed through a glass barrier to powder catalase and results showing bioelectromagnetic changes in metabolism of the human hair follicle are presented (Fig 1). The human hair follicle has been described as a dynamic mini-organ with the potential to be used in research to develop novel therapeutic techniques [7]. The living cell produces catalase in organelles called peroxisomes and is explained as follows: "Peroxisomes originally were defined as organelles that carry out oxidation reactions leading to the production of hydrogen peroxide. Because hydrogen peroxide is harmful to the cell, peroxisomes also contain the enzyme catalase" [8].

Evidence shows that catalase and its protective role in cell survival are ubiquitously found in both plants and animals cells. Its protective role in the decomposition of cellular respiration toxic by-products, such as H_2O_2 is a continuous process in living matter [9]

We hypothesize that the inhibition of organized crystals dendrites formation attracted to the hair follicle caused by the underlying layer of catalase is due to the direct clash between the enzyme catalase vertically transmitted electromagnetic forces and the human hair follicle biomagnetism. For example, when human hair follicles are fronted, and mounted in a SSP PBS Fe₂K, the opposing biomagnetic forces cause the distinct absences of crystals dendrites around both living follicles [10].

We further hypothesize, based on the present body of knowledge and evidence presented in this study that internal EMFs influencing biosystems are emitted through EMFs during ROS reactions occurring during cellular respiration. Furthermore, the evidence in this study is supportive of a chronic internal bioelectromagnetic bombardment in the cells by the ever continuous Redox reactions. These chronic EMF states are ever present in living tissue during cell respiration since the cell has multiple areas of Reactive Oxygen Species formation [11]. Our chronic bombardment theory is further supported by published information in the scientific literature of catalase having electromagnetic properties such as catalase utilized as a "magnetic switching in cell proliferation by a catalase–nanomagnetite complex [12] and used as electrochemical sensors since "in the presence of nano-materials, the direct electron transfer between the heme

groups of the enzyme and the electrode surface improved significantly" [13].

5. Clinical Implications

The intrinsic EMFs arising from Redox reactions during cellular respiration act as a possible mechanism responsible for cellular DNA changes. Our findings present the emission of electrobiomagnetic forces during the H_2O_2 molecule breakdown in a processed meat sample attributed to ubiquitously presence of catalase.

Numerous publications linking antioxidant levels/catalase and Redox reactions with cancer have been reported [14,15,16, 17] Regardless of the fluctuations found in antioxidants (catalase) and ROS activity, there is no controversy as to reports showing genetic instability, cell proliferation and angiogenesis in cancer progression aggressiveness triggered by ROS metabolism [3]. The presence of intrinsic EMFs generation by catalase proper and during ROS reactions are presented. Catalase proper is shown to induce *in vitro* metabolic changes on *ex vivo* freshly harvested human hair follicles. The Redox reaction by combining H_2O_2 and catalase is also shown *in vitro* to exhibit EMFs emissions. We hypothesize that due to the presence of internally emitted EMFs during cell respiration, there exists a propitious niche for cellular genetic changes that could lead to DNA damage and its consequences.

6. Limitations

We did not measure the powder catalase strength used during the experimental testing. Only H_2O_2 with a 3% concentration was used to start the Redox reaction.

7. Conclusions

Using a nano- sized iron particles solution, *in vitro* exposure of freshly plucked *ex vivo* human abdominal hairs were indirectly exposed through a glass barrier to EMFs emitted by powdered catalase proper and ROS reactions using samples of processed meat in contact with H_2O_2 . These EMFs were detected and documented causing metabolic changes in the human hairs as well as a disruption of the crystallization process of the nanoparticles solution. This study suggests that, due to the presence of chronic internally emitted EMFs during cell respiration, there exists a propitious niche for cellular genetic changes that could lead to DNA damage and its consequences. Of interest is also the finding of EMFs emitted by processed meat during H_2O_2 breakdown suggesting the presence of catalase [18]. Further research is warranted.

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