Physiology

Demonstration of Inherent Electromagnetic Energy Emanating from Isolated Human Hairs.

Abraham A. Embi[1], Jerry I. Jacobson[2], Kaustuv Sahoo[3], Benjamin J. Scherlag[4]

[1] 13442 SW 102 Lane Miami, FL 33186, USA. [2]Pico-Tesla Magnetic Therapies, LLC. Clearwater, FL, USA. [3]Center for Veterinary Health Sciences, Oklahoma State University, Stillwater, OK, USA. [4]Heart Rhythm Institute, University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA

The presence of hair is widely prevalent in mammals. The human hair structurally consists of a follicle (under the skin) and a shaft protruding from the epidermis. The follicle (commonly known as the root) is described to be a mammalian skin organ, with different functions. One of the primary functions is hair growth and replacement; other role is acting as sensory mechanisms. It is stated that the hair senses changes in position by activating the nerve endings anchored in the follicle. This manuscript introduces for the first time the detection and documentation of inherent electromagnetic forces emanating from human hairs. That was accomplished by preparing a solution containing nano-sized iron nanoparticles (mean diameter 2000 nanometer, nm) and Prussian Blue Stain (PBS Fe 2000). The intact hair plucked from the forearm was mounted on a glass slide and covered with the PBS Fe 2000, then covered with a second slide. Electromagnetic forces express themselves as magnetic lines of force containing the aggregating iron particles circulating around the follicle. In addition, intermittent flashes of light emanating from the follicles were transformed into trails of aggregating iron particles. *Journal of Nature and Science, 1(3):e55, 2015*

hair follicle | electromagnetic forces | nano-sized iron nanoparticles

Introduction

Hair has been described as "a unique characteristic of mammals" and has several functions, from protection of the skin to sexual and social communication. The hair consists of a follicle or bulb, below the skin. Rapidly proliferating matrix cells in the follicle produce the hair shaft, above the skin. The shaft is composed of an outer layer of overlapping layers of keratin and inner structures, the cortex and medulla. The latter two are composed of intermediary filaments and proteins [1]. In the literature, there are various studies about hair that take into consideration different aspects within many fields of science, including biology, dermatology, cosmetics, forensic sciences, and medicine"[2]. We present for the first time documentation of inherent electromagnetic (EM) activity of the human hair that can be imaged using nano-sized iron particles and a specific stain for iron.

Materials and methods

Preparation of Iron containing Solution

A fine iron particle solution was prepared by mixing several grams of powdered iron filings (Edmond Scientific, Co., Tonawanda, NY) in 200 cc of deionized water (resistivity, 18.2 MΩ.cm). After standing for several hours the supernatant was carefully decanted for sizing of the iron nano-sized iron particles. The particle size and distribution of the nanoparticles from the supernatant was determined using dynamic light scattering (DLS). The zeta potential, a measure of particle electrical stability was determined using phase analysis light scattering by a Zeta potential analyzer (ZetaPALS, Brookhaven Instruments, Holtsville, NY). For sizing, 1.5 ml of the solution in de-ionized water was scanned at 25 °C and the values obtained in nanometers (nm). A similar aliquot of the fine iron particle solution was scanned for 25 runs at 25 °C. for determining zeta potentials (in millivolts).Using a transfer pipette an aliquot of the solution containing the iron particles (mean particle size 2000 nm) was combined with an aliquot of the solution containing Prussian Blue Stain (PBs, 2.5% potassium ferrocyanide. 2.5% hydrochloric acid). The final solution will be referred to as (PBS Fe 2000) in the manuscript,

Glass slides preparation: "The Sandwich" (SDW)

Human forearm hair (from authors) was plucked by tweezers. The hair was placed in the center of a microscopic slide (Fisherbrand Plain precleaned slides Cat # 12-550D size 25 x 75x 1 mm). Three drops of the PBS 2000 solution were placed, one on the hair follicle, the other two close to the lateral edge of the slide. A second slide was carefully placed covering the first. This preparation was dubbed "The Sandwich" (SDW). An absorbent paper towel was situated under the SDW to collect any spilled aliquot. Additionally and gently two thin (1/4 inch) wide masking tape strips 2 inches long were used to secure the ends of the SDW, thus, facilitating the labeling as well as preventing any movement of the hair inside the SDW when it is placed on the microscope stage. The viewing and event recordings (still pictures or videos) of the slides were done in the normal mode at X10 magnification with a video microscope (Celestron LCD Digilat Microscope II model #44341 Torrance California USA).

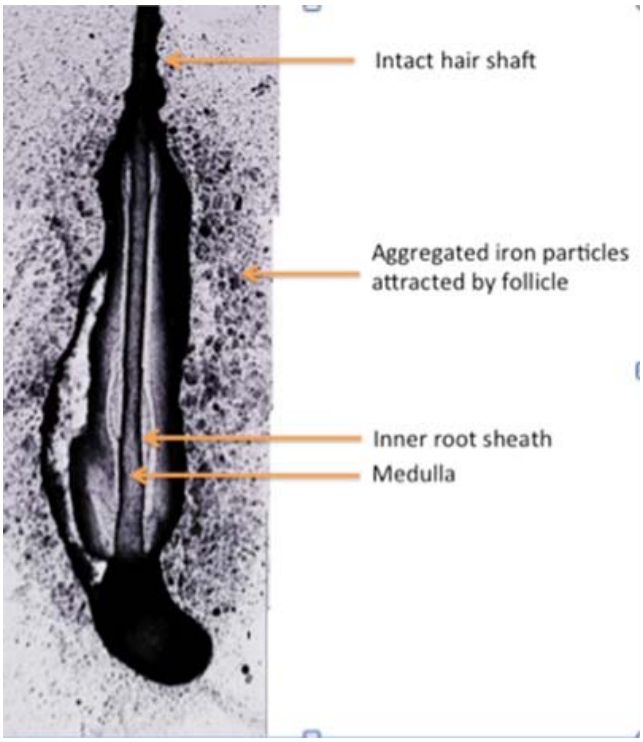

Figure 1. Human Hair: Several frames were superimposed from the video to show the follicle and the base of the hair shaft surrounded by the aggregated iron particles attracted toward the follicle from the PBS Fe 2000 solution. SDW. Note the area sliced exposing the bulge area inner anatomy.

Conflict of interest: No conflicts declared.

*Corresponding Author: Abraham A. Embi, BS, MBA/HA. 13442 SW 102 Lane, Miami, FL 33186, USA. Phone: 305-387-6102
E-mail: embi21@att.net

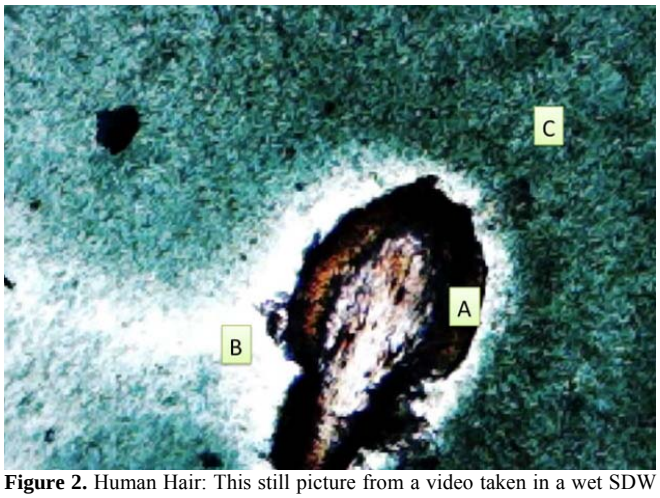

Figure 2. Human Hair: This still picture from a video taken in a wet SDW of PBS Fe 2000 solution Notice the aggregated iron particles circulating in a counterclockwise direction around the human hair follicle/ bulb area: A) Follicle B) White light electromagnetic Ray emanating from the follicle area C) Aggregated iron nanoparticles.

S1. This figure has a supplemental video available online: http://www.jnsci.org/files/video/e55/S1.htm

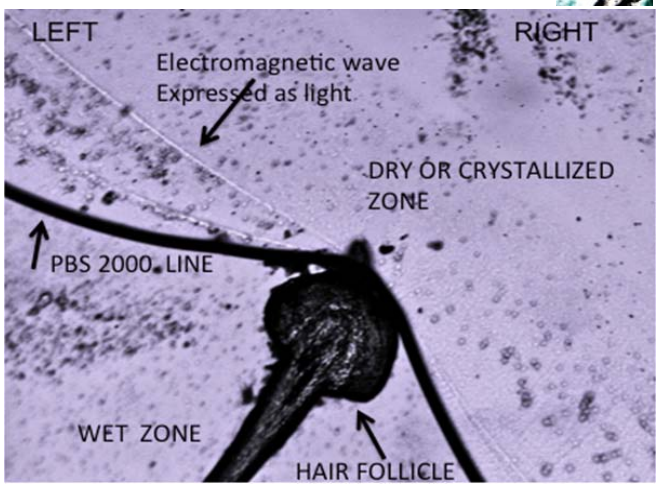

Figure 3. Human Hair: Example of electromagnetic radiation emanating from the human hair follicle. As the PBS Fe 2000 evaporation line moved from the dry to wet zone, light energy rays were emitted from the follicle. Note the aggregation of iron particles along the course of the light rays.

S2. This figure has a supplemental video available online: http://www.jnsci.org/files/video/e55/S2.htm

Results

A total of n=15 forearms human hairs were SDW and studied. All showed evidence of electromagnetic activity within and emanating from the follicle area. In Figure 1, the aggregated iron particles can be seen surrounding the follicle. The structures within the follicle are annotated in the figure. The most dramatic observation consisted of the movement of the aggregated iron particles around the follicle which were only seen in a wet field (Figure 2 + video). When the liquid fully evaporated, these particles remain fixed in the ensuing dry field. Furthermore, as in Figure 3, we observed that, intermittent electromagnetic radiations, i.e., white light rays, emanating from the follicle was often revealed during the slow moving evaporation line of the solution within the SDW. For example, the precise time of appearance of the white light rays emanating from the follicles was documented by videotaping the slow moving drying line (Figure 3 video). The human hair is seen emitting a white light ray that was imaged by aggregated iron particles forming trails following the course of the radiations.

Discussion

Major findings:

We documented evidence showing the presence of electromagnetic activity within human hair follicles. Moreover, videos showed that the follicle emitted electromagnetic radiations as light rays whose path was imaged by the attraction of the aggregated iron particles.

Background

The presence of magnetism in the biological tissue has been pursued by researchers over the years [3]. As discussed by Kirschvink [4], a typical chain of single-domain magnetite (magnetosomes) has been extracted from sockeye salmon; but subsequent research in trying to locate magnetite has been unsuccessful for example in bees. On the other hand, not until the 1990's have investigations with high resolution electron microscopy and electron diffraction on human brain tissue identified magnetite crystals [5].

Implications

Our findings could be used to explore the clinical significance of electromagnetic energy, or lack thereof, in some hair diseases with absence of color such Alopecia, vitiligo and as well as psychiatric disorders [2,6]. The prevalent literature as to how the nervous system detects hair positional changes in response to external stimuli is attributed to mechano-receptors at the follicle's nerve endings. The role of these electromagnetic forces in the hair acting as sensory mechanisms are in need of further study.

Limitations

It could be argued that the iron track trails seen in figure 3 as the evaporation line progressed were formed by the evaporation line itself. However, in this study, it was only when the evaporation line was in the vicinity of the follicle did the light rays and ensuing iron aggregate trails manifest. Note that there are no light rays or iron trails in the dry crystallized zone.

Conclusions

Isolated human hairs were placed between two glass slides containing a solution of nano-sized iron particles (mean diameter, 2000 nanometers) and a Prussian Blue stain for iron. We observed iron particle aggregates, which surrounded the bulb area and circulated within an electromagnetic field associated with the follicle.

In addition, as the evaporation of the solution occurred, electromagnetic radiations, rays of white light, emanated from the follicle and were imaged as iron aggregate trails following the course of these radiations.

Acknowledgements

Supported by an unrestricted grant from the Helen and Wilton Webster Foundation through the Oklahoma Research Foundation.

1 Buffoli B, Rinaldi F, Labanca M, Sorbellini E, Trink A, Guanziroli E, Rezzani R, Rodella LF (2014) The human hair: from anatomy to physiology. Int J Dermatol. 53: 331-41.

2. Walker A, Mesinkovska NA, Boncher J, Tamburro J, Bergfeld WF (2014) Colocalization of vitiligo and alopecia areata presenting as poliosis. Cutan Pathol. Ahead of publication PMID: 25388912

3. Coetzee H Biomagnetism and Bio-electromagnetism: The foundation of Life. Originally published in *Future History,* Volume 8],

4. Kirschvink, J L (1989) Magnetic Biomineralization and Geomagnetic Sensitivity in Higher Animals: An update and Recommendations for Future Studies." Bioelectromagnetics 10: 239-259.

5. Kirschvink, J L, Kobayashi-Kirschvink A, Woodford BJ.(1992) . "Magnetite biomineralization in the human brain." Proceedings of the National Academy of Sciences 89: 7683-7687.

6. Maekawa M, et al. (2014) Utility of Scalp Hair Follicles as a Novel Source of Biomarker Genes for Psychiatric Illnesses. Biol Psychiatry. 2014 Sep 11. pii: S0006-3223(14)00570-8. doi: 10.1016/j.biopsych.2014.07.025.