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When Good People Publish Bad Science — Comments on EMF Responsiveness of the Pfizer and Moderna COVID-19 Injectables Reported by Lee and Broudy (2024)

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Abstract

It is reported that the various geometric structures identified microscopically in the Pfizer and Moderna COVID-19 injectables are responsive to manmade, radio-frequency EMF, such as that emitted by a mobile/cell phone on a wireless charger. However, this conclusion requires further investigation and validation.

Keywords: COVID-19, vaccine, Pfizer, Moderna, EMF

Introduction

The following commentary was initially written as a letter to the editor. I have retained some of its form in this brief examination of the evidence, presented by Lee and Broudy (2024), that the various microscopic structures identified in the Pfizer and Moderna COVID-19 injectables are responsive to manmade, radio-frequency electromagnetic fields (EMF).

My background is in veterinary medicine and publishing. Having worked as a medical writer and editor for over 30 years in tandem with my veterinary career, my interest here is in the scientific method. In scientific investigation, if there is another plausible explanation for an observed phenomenon, then it needs to be considered in the study design, analysis, and/or interpretation. Otherwise, conclusions may be reached that are incomplete, at best, and potentially incorrect.

For example, the similarities between the response to warming (Figure 22) and the response to EMF exposure (Figure 23) in the Lee-Broudy paper struck me as important.

Response to Warming

In the Heat experiment (described on pages 1187 and 1216), the two test solutions — Pfizer or Moderna injectable in 0.9% sodium chloride (normal saline solution) — were placed on a heating plate set to 36.5 °C and left overnight. By morning, microscopic crystalline structures had formed on the top of the solution:

> "The next morning assembled nanostructures were observed [microscopically] floating over the surface of the medium in more discernible and developed shapes than before the heat (warming) exposure. Two to three weeks were needed for the growth of structures at room temperature (15~20 °C) whereas one evening was needed for the same growth at body temperature (Figure 22)." [p. 1216]

We don't know how long it took for these structures to form or elaborate when warmed; it could have been 1 hour or less. Nor do we know the temperature of the test solution at the time. Each solution wasn't re-examined until the following morning, and its temperature was not measured (or, at least, is not reported).

Ulrich (2024) has already addressed the likelihood that these floating microstructures were lipids or had a substantial lipid component. At least at the macroscopic scale, small metallic objects can be induced to float on water using nanoscale etching that traps air (Zhan 2019); but even at microscale, such objects would likely look and behave very differently under a stereomicroscope than those shown by Lee and Broudy. Hence, the suggestion made by the authors that these microstructures are biohybrid magnetic robots, "magnobots" to be precise, appears unsupported at this point.

Response to EMF Exposure

In the main EMF experiment (pages 1187 and 1216), the four test solutions — Pfizer or Moderna in distilled water or normal saline — were placed directly onto a mobile/cell phone for 1–2 hours while the phone was in 5G streaming mode.

The phone itself sat atop a wireless charger — *i.e.,* the charger is connected to the municipal power supply; the phone is placed on top of it so that the phone battery can be recharged wirelessly. The authors don't specify whether the charger was plugged in and turned on for this experiment, but in Figure 3(b), which shows three culture plates on a smartphone screen, the charger beneath the phone is clearly turned on.

In this particular experiment, there were striking differences between the Pfizer and Moderna solutions. Multiple crystalline structures with fairly simple geometric shapes appeared at the top of the Moderna solution within 1 hour of exposure, whereas the Pfizer solution remained unchanged:

> "Even after 1 hour of exposure to the wireless recharger with a cellular phone in operational mode, Moderna showed noticeable immediate changes. The floating materials abruptly became larger and more numerous with sharper and more rectangular edges (Figure 23). In contrast, Pfizer showed no immediate response…" [p. 1216]

It wasn't until 1 month after this exposure that the Pfizer solution showed any change: "a moderate proliferation of floating filaments (Figure 24)."

There are at least two differences between the test solutions that are worth considering in relation to this differential response. The first is that the Moderna product may have contained more than three times the concentration of lipid-encapsulated modified RNA as the Pfizer product. The vial contents aren't specified by the authors, but in 2021, when this study was conducted, the Moderna

product reportedly delivered 100 μg/dose (Anon 2022) and the Pfizer product for adults 30 μg/dose (Liu 2021).

Second, the Moderna solutions were incubated for 36 days before EMF exposure, whereas the Pfizer solutions were incubated for 101 days. The experimental protocol involved replenishing the medium (distilled water or normal saline) weekly or as-needed during the year-long study to prevent the materials from drying out and crystallizing. No mention is made of replenishing the test material, though, so the Pfizer solution on day 101 may have been more dilute than the Moderna solution on day 36.

However, this difference should have had little impact, given that the graph shown as Figure 9 indicates substantial development of these microscopic structures at both times, for both products. Development of these structures peaked between 2 and 6 months of incubation, regardless of the product or medium (distilled water or normal saline).

Again, the Pfizer solution showed no response during EMF exposure, and only a very small and arguably immaterial change one month later. This, despite the fact that the authors singled out the Pfizer product thus:

> "Observations during our incubation studies suggest the presence of magnobots [biohybrid magnetic robots], especially in the Pfizer sample." [p. 1228]

Furthermore, in the photomicrograph of the Moderna solution prior to EMF exposure (Figure 23, a), multiple structures appear faintly in the background, as if settled at the bottom of the medium, as illustrated and annotated in Figure 2. Might they simply have changed position within the liquid medium during this experiment — *i.e.,* might they simply have risen to the top — making them more noticeable under the stereomicroscope focused on the near field (the surface of the medium)? In the 'after' photo (Figure 23, b), the geometric shapes appear to be at various depths in the liquid medium, as some are larger and more defined than others.

What is not considered in this experiment is the possible effect of heat generated by the phone in streaming mode, by the phone as its battery charged, and by the wireless charger itself. Another possible source of heat during examination is the light used to illuminate the specimen on the microscope stage (see Figure 1). We are not told anything about the light source, nor whether a cooling system was used.

Although it is unlikely that these various heat sources raised the temperature of the test solution into the physiologic range, it is entirely possible that in the 1–2 hours the solution sat on the electronic devices and for however long it then sat on the microscope stage under a light, it was warmed above the ambient temperature (15–20 °C). At what temperature is development of these structures appreciably accelerated?

A second possibility is kinetic energy generated by physical disturbance of the test solution, such as mechanical vibration from one or both electronic devices that is imperceptible to the human senses. Or perhaps the phone randomly received a call, text, or other alert during the exposure period for the Moderna product but not for the Pfizer. And then there is the inevitable movement of the solution during transfer from the test area to the microscope. That aspect of the experimental

protocol was not described at all, yet it is relevant for all experiments in which the sample was moved from one place to another.

Likewise, Brownian motion was not considered. The authors describe the microscopic structures in the test solutions as "freely moving," yet at this scale (magnification up to 400X), Brownian motion must be on the list of possible explanations for any observation of particles randomly moving in liquid media, including the anti-gravitational movement of particles up through the fluid column. Raise the temperature even a little, and these movements become even more significant.

My point is that the energy for assembly of these microstructures must come from somewhere. In this study, EMF exposure was only one possible source, yet it was the only source considered.

As the authors themselves stated:

> "Ultraviolet radiation, visible light, temperature, nitrogen, sources of carbon in the air, electromagnetic fields, various wave frequencies, and other factors can evidently trigger nanoparticles to react — whether to assemble or disassemble what appear to be pre-programmed structures." [p. 1225]

In short, other plausible explanations for the observed effect appear to have been overlooked in the design and interpretation of this experiment. Nor was any explanation offered for why the Moderna solution appeared to be EMF-responsive whereas the Pfizer solution was not, even though both were tested within the incubation window in which multiple structures formed with both products.

Second EMF Experiment

Confounding things further, there was another experiment involving EMF: exposure to an external hard drive connected to a personal computer (pages 1188 and 1217). The test solutions were placed on the hard drive for 2 hours while the drive was activated by various file management tasks. This exposure had no effect on the Moderna solution and only slight effect on the Pfizer solution (Figure 25):

> "After two hours of exposure… Moderna showed no noticeable effects, but Pfizer showed modest disruptive changes — slightly blurred boundary lines across structures with softer edges sitting at the bottom of the culture dishes." [p. 1217]

This subtle blurring is suggestive of physical disturbance, such as a fine vibration indiscernible to the human senses which slightly disrupted the architecture of the structures or slightly increased the opacity of the liquid medium. At the conclusion of this experiment, the Pfizer solution was placed on the wireless charger for another 2 hours. In that time, the microstructures partially returned to their original appearance: "sharper-edged and clearer forms" (Figure 25).

Again, physical explanations were not considered for these very slight and arguably irrelevant changes. Instead, the authors embarked on a rather tortured attempt to explain the discrepancies between the two EMF sources, while completely ignoring the differences between the two products:

> "With the results of this preliminary study, it could be postulated that some kind of conditioned electric current can stimulate the nanostructure's activity, while some conditioned magnetic current can hamper their activity." [p. 1217]

The authors appear to have dismissed the tenfold difference in electrical output between the two devices — 300 v/m for the phone–charger and 30 v/m for the hard drive — and focused instead on the magnetic fields: 0 μT for the phone–charger and 4 μT for the hard drive.

As a point of reference, the earth's geomagnetic field is between 25 and 65 μT (Findlay 2010). At a distance of 30 cm (1 ft), various home or office electronics that may be relevant to this study can have magnetic fields that approach or exceed 4 μT, including a desktop light (3.3 μT) and a computer monitor (up to 13.5 μT; Neutra 2002).

As to that, did the heating plate used in the warming experiment generate an electromagnetic field? We don't know, as it does not appear to have been measured.

Later, in the discussion, the authors make this surprising statement:

> "[P]reliminary observations show that the materials in the injectables react positively to wireless cell phone rechargers while they react negatively to external hard drives." [p. 1226]

However, this statement is strangely at odds with their reported findings. At best, it greatly overstates the results of the first EMF experiment, and it couches the lack of response in the second as a "negative" reaction. In a discussion involving electromagnetic fields, use of the words positive and negative is confusing.

Furthermore, missing from these experiments is any mention of replicates. The authors appear to be basing their conclusions on a single sample of each combination: Pfizer or Moderna product in distilled water or saline. It would have been better to (a) repeat each experiment at least once to verify the initial results, or (b) incubate each sample in duplicate or triplicate.

The potential for spurious results is much greater with solitary samples than with replicates, hence the general practice of verifying one's results *within* the study design and experimental protocol. The authors did note in the first EMF experiment that the medium (distilled water or normal saline) didn't seem to make any difference:

> "Reactions seemed to be the same in normal saline and in distilled water." [p. 1216]

However, it would be foolhardy to assume *post hoc* that one medium served as an accidental replicate for the other.

Lastly, the authors offered that "distilled water served as an ideal medium" for such studies — yet no part of the human body is composed of distilled or pure water. In fact, blood plasma and other body fluids may be described as colloidal suspensions containing a variety of electrically charged particles-in-suspension and solutes. What is the point of such an experiment when it has little or no relevance to human physiology? Does our physiology amplify these observed effects or impede them?

Concluding Thoughts

While the artificial microstructures that form in or from these Pfizer and Moderna injectables may very well be EMF-responsive, this study does not conclusively prove it. The reason I raise this issue and focus on what may appear to be small details is because I am concerned that many who give this paper only a cursory read, or simply look at the illustrations, may accept without question the authors' conclusion that these injectables are responsive to manmade EMF.

I have no doubt that some, if not all, of the microstructures identified by these authors and others are unnatural, are in these products by design, and are intended for undisclosed and likely nefarious purposes. However, we still need to design and implement robust scientific studies that settle the question of whether these structures are indeed EMF-responsive, in what way, to what extent, under what conditions, and to what end.

An additional concern, and one directly related to the question of EMF-responsiveness, is how little the structures in this study resemble the complexity and apparent sophistication and purpose of those documented recently by Nixon (2025) using both dark- and bright-field microscopy. Some of the more advanced structures Nixon presents look for all the world like micro-electronic circuitry components. In contrast, the structures in the Lee-Broudy study are relatively rudimentary.

There is so much we don't know about the contents of these injectables and their effects on the human body, yet so many assumptions have been made and assertions confidently broadcast. Our credibility as concerned scientists and citizens is on the line, and we cannot afford for our concerns to be dismissed — or worse, our efforts discredited — because we are speaking in advance of irrefutable scientific evidence.

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About the Author

Christine King, BVSc, MANZCVS, MVetClinStud, is a veterinarian with 40 years of experience, spanning private practice and veterinary teaching hospitals in Australia and the US. She has a postgraduate degree in clinical practice (equine medicine) and a master's degree in equine exercise physiology (clinical exercise testing of racehorses). She has also worked as a medical writer/editor for the past 30 years, shepherding dozens of clinical research papers through the peer-review process. Although her practice approach has been holistic for the past 25 years, she remains a self-described science nerd (complete with white cape and secret decoder ring) who retains a passion for good science and good scientific reporting, each being as important as the other. Alas, the study by Lee and Broudy (2024) is neither.

References

Anon. (2022) Moderna reports fourth quarter and fiscal year 2021 financial results and provides business updates. [Web page] https://investors.modernatx.com/news/news-details/2022/Moderna-Reports-Fourth-Quarter-and-Fiscal-Year-2021-Financial-Results-and-Provides-Business-Updates/. Published on 24 February, 2022; accessed on 21 April, 2025.

Finlay, C. C., Maus, S., Beggan, C. D., *et al.* (2010) International geomagnetic reference field: the eleventh generation, *Geophysical Journal International*, 183(3): 1216–1230. https://doi.org/10.1111/j.1365-246X.2010.04804.x

Lee, Y. M., & Broudy, D. (2024). Real-time self-assembly of stereomicroscopically visible artificial constructions in incubated specimens of mRNA products mainly from Pfizer and Moderna: a comprehensive longitudinal study. *International Journal of Vaccine Theory, Practice, and Research,* 3(2), 1180–1244. https://doi.org/10.56098/586k0043

Liu, Y., Liu, J., Xia, H., *et al.* (2021). Neutralizing activity of BNT162b2-elicited serum. *New England Journal of Medicine,* 384: 1466–1468. https://doi.org/10.1056/NEJMc2102017.

Neutra, R. R., DelPizzo, V., Lee, G. M. (2002) An evaluation of the possible risks from electric and magnetic fields (EMFs) from power lines, internal wiring, electrical occupations, and appliances. *California EMF Program,* p. A-164. https://ehtrust.org/wp-content/uploads/CA-EMF-.pdf

Nixon, D. (2025). Active microscale construction in Pfizer Comirnaty: investigating complex self-assembling structures. *Journal of Bionanotechnocracy,* 1(1): 1–114. https://cdn.manula.com/user/15577/docs/active-microscale-construction-in-pfizer-comirnaty-20250409-final.pdf

Ulrich, A. S. (2024). No Nanobots in Vaccines — Just Lipids on the Loose: Commentary on Lee and Broudy (2024), "Real-Time Self-Assembly of Stereomicroscopically Visible Artificial Constructs in Incubated Specimens of mRNA Products Mainly from Pfizer and Moderna: A Comprehensive Longitudinal Study." *International Journal of Vaccine Theory, Practice, and Research,* 3(2), 1244.1–1244.10. https://doi.org/10.56098/7hsjff81

Zhan, Z., ElKabbash, M., Cheng, J., *et al.* (2019). Highly floatable superhydrophobic metallic assembly for aquatic applications. *ACS Applied Materials & Interfaces,* 11: 48512–48517. https://doi.org/10.1021/acsami.9b15540