

QUANTUM BIOLOGY



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TLS OPPOSING CUBE STUDY

Enhanced Bioelectrical Response Generated Between Two Opposing TLS Cubes

Introduction

This study evaluates the effect of the bioelectrical field created between two opposing TLS Cubes using Electrochemical Impedance Spectroscopy (EIS). EIS is a well-established electro-diagnostic technique used to assess electrical properties such as impedance, conductivity, and frequency-dependent electrical behavior at the whole-body, cellular, and molecular levels (Yang, 2011; Hossain, 2021). In the present study, EIS was used to measure changes in the electrical characteristics of living human buccal (inner cheek) cells following one hour of exposure to the field generated between two TLS Cubes positioned opposite one another.

Previous investigations conducted by the Quantum Biology Research Lab demonstrated that exposure to a single TLS Cube produced a measurable increase in cellular impedance following one hour of exposure. Building upon those findings, the present study was designed to determine whether positioning two TLS Cubes opposite one another would enhance the observed bioelectrical response and produce greater changes in cellular electrical activity over the same exposure period.

The objective of this study was to evaluate the magnitude of the bioelectrical effects generated between two opposing TLS Cubes and compare those results to the response previously observed with a single Cube. By comparing electrical measurements obtained before and after exposure, this study provides quantitative data regarding the influence of the opposing Cube configuration on cellular electrical properties and membrane-associated bioelectrical activity.

Scientific Basis

Electrochemical Impedance Spectroscopy measures how electrical energy moves through, interacts with, and is stored within biological systems. These measurements provide information about the electrical characteristics of cell membranes and the body's overall bioelectrical state. Previous studies have demonstrated that cellular impedance plays an important role in determining how biological tissues interact with electromagnetic and electrical influences (Hossain, 2021).

Impedance consists of both real and imaginary components. The real component reflects resistance to electrical current flow and energy dissipation within a biological system, whereas the imaginary component reflects the storage and accumulation of electrical charge and is strongly influenced by capacitive properties and cellular water content (Hossain, 2021). Together, these measurements provide a more complete characterization of the dielectric and bioelectrical properties of living cells than either component alone.

Previous scientific investigations have reported associations between impedance measurements and important physiological characteristics including cellular integrity, fluid balance, tissue health, and cellular function. Higher impedance values have been correlated with improved cellular integrity (Yamada et al., 2022), healthier fluid balance (Catapano et al., 2023), reduced edema, improved venous function, and decreased risk of swelling (Kim et al., 2025). In addition, both real and imaginary impedance measurements have been utilized to evaluate biological responses and distinguish differences between healthy and diseased tissues (Ahmad et al., 2018; Naranjo-Hernández et al., 2019). Because cellular communication and biological processes depend upon electrical activity, measurable changes in impedance may indicate alterations in the bioelectrical environment of the body.

What This Study Demonstrates

This study was specifically designed to evaluate whether the field generated between two opposing TLS Cubes produces a greater bioelectrical response than that observed from a single Cube under the same exposure conditions. Measurements were obtained before and after a one-hour exposure period while a subject was positioned centrally between two opposing Cubes.

Previous testing demonstrated that a single TLS Cube produced a measurable 15% increase in cellular impedance following one hour of exposure. Importantly, that measurement represents only the effect observed after a single

hour. Additional studies and longer-term observations have shown that continued exposure to the TLS Cube can produce substantially larger increases in bioelectrical activity, with measured effects exceeding 200% over extended periods of use.

The purpose of the present study was not to compare the maximum potential effects of a single Cube versus two Cubes over time, but rather to compare the effects of both configurations after the same one-hour exposure period. Under these controlled conditions, the opposing Cube configuration produced an 82% increase in real impedance and a 31% increase in imaginary impedance, compared to the 15% increase previously observed with a single Cube after one hour.

These findings indicate that while a single TLS Cube produces measurable changes in cellular electrical activity within a relatively short period of time, positioning two Cubes opposite one another significantly amplifies the bioelectrical response during the same exposure window. The approximately five-fold greater increase observed with the opposing Cube configuration suggests that the interaction between the two Cubes creates a substantially stronger bioelectrical effect than that achieved by a single Cube alone during the first hour of exposure.

The results provide quantitative evidence that the field generated between two opposing TLS Cubes measurably influences multiple aspects of cellular electrical activity and produces a significantly enhanced bioelectrical response compared to a single Cube when evaluated over an identical one-hour treatment period.

Methods

The bioelectrical effects generated between two opposing TLS Cubes were evaluated using the Electrochemical Impedance Spectroscopy (EIS) methodology described above. EIS measurements were performed on living human buccal (inner cheek) cells collected before and after exposure to the dual-Cube configuration.

Buccal cells were obtained by gently collecting cells from the inner cheek and transferring them into purified water for analysis. Two electrodes were then immersed into the cell suspension and connected to the Impedance Spectrophotometer. While the instrument measures a wide range of electrical parameters, real and imaginary impedance were selected for analysis because

they consistently produce the largest and most reproducible responses in biological systems.

The objective of the experiment was to compare the bioelectrical effects of two opposing TLS Cubes to those previously observed with a single Cube during the same one-hour exposure period. The subject was positioned centrally between two TLS Cubes placed approximately three feet apart and remained in that location for one hour. To minimize potential external influences, cell phones, computers, and other electronic devices were not present during the exposure period.

Impedance measurements were obtained immediately before and after exposure. Percent change values were calculated relative to baseline measurements collected prior to treatment. Each sample was measured in triplicate, and the average value was used for analysis. All results presented in this study are reported as percent change from baseline.

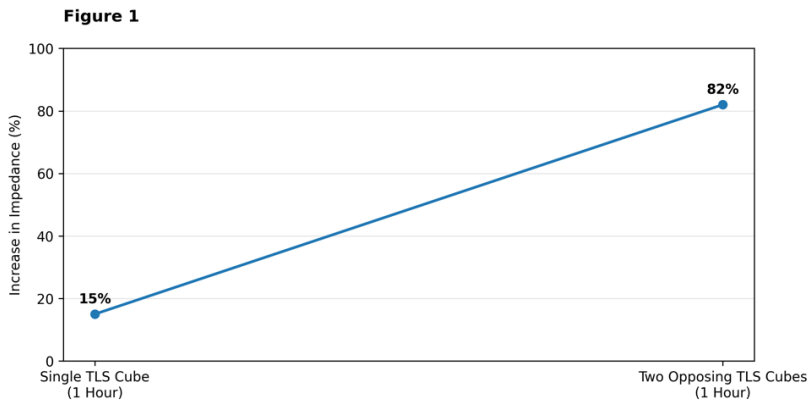
The measured responses obtained from the opposing Cube configuration were then compared to previously collected one-hour exposure data from a single TLS Cube in order to evaluate differences in the magnitude of the bioelectrical response under identical treatment durations.

Results and Discussion

Figure 1 compares the bioelectrical response produced by a single TLS Cube and two opposing TLS Cubes following the same one-hour exposure period. Previous testing demonstrated that exposure to a single TLS Cube for one hour produced a measurable 15% increase in cellular impedance. While this represents a significant bioelectrical response over a relatively short period of time, it reflects only the effects observed during the first hour of exposure. Longer-duration studies have shown that continued exposure to a TLS Cube can produce substantially greater increases in bioelectrical activity, with measured responses exceeding 200% over extended periods of use.

The purpose of the present study was to determine whether positioning two TLS Cubes opposite one another would enhance the bioelectrical response during the same one-hour treatment period. As shown in Figure 1, exposure to the opposing Cube configuration produced an 82% increase in real impedance after one hour, compared to the 15% increase previously observed with a single Cube during the same exposure period.

One-Hour Bioelectrical Response Comparison



These results indicate that the opposing Cube configuration generated a bioelectrical response approximately five times greater than that observed with a single Cube after one hour of exposure. Because both measurements were obtained using identical exposure durations and the same EIS methodology, the observed difference can be attributed to the Cube configuration rather than treatment time.

The findings suggest that positioning two TLS Cubes opposite one another significantly amplifies the measurable bioelectrical effects observed during short-term exposure. While a single TLS Cube is capable of producing meaningful changes in cellular electrical activity, the opposing Cube configuration produces a substantially larger response within the same treatment window, indicating that the interaction between the two Cube fields enhances the overall bioelectrical effect.

To further characterize the nature of this enhanced response, both the real and imaginary components of impedance were evaluated. These results are presented in Figure 2.

Bioelectrical Response of Two Opposing TLS Cubes (1 Hour)

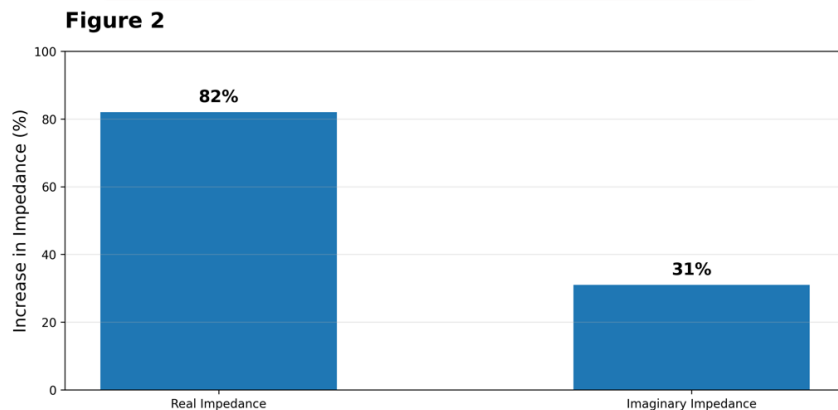


Figure 2 provides a more detailed characterization of the bioelectrical response generated by two opposing TLS Cubes. While Figure 1 demonstrates that the opposing Cube configuration produces an approximately five-fold greater bioelectrical response than a single Cube after the same one-hour exposure period, Figure 2 shows how that response is distributed across the real and imaginary components of impedance.

Following one hour of exposure, real impedance increased by 82%, while imaginary impedance increased by 31%, indicating measurable effects on multiple electrical properties of living cells. The larger increase in real impedance suggests a stronger influence on the movement of electrical current through biological tissues, while the increase in imaginary impedance suggests corresponding changes in the storage and accumulation of electrical charge at the cellular membrane.

Importantly, the relationship between real and imaginary impedance was consistent with that observed in single Cube testing, suggesting that the opposing Cube configuration amplifies the same underlying bioelectrical response rather than producing a fundamentally different effect. Taken together, Figures 1 and 2 demonstrate that positioning two TLS Cubes opposite one another significantly enhances both the flow and storage of electrical energy within living cells compared to a single Cube during the same one-hour exposure period.

Conclusion

The results of this study demonstrate that exposure to the field generated between two opposing TLS Cubes produces a substantially greater bioelectrical response than exposure to a single TLS Cube during the same one-hour treatment period. Previous testing showed that a single TLS Cube produced a measurable 15% increase in cellular impedance after one hour of exposure, while the opposing Cube configuration produced an 82% increase in real impedance and a 31% increase in imaginary impedance under identical exposure conditions. These findings indicate that positioning two TLS Cubes opposite one another significantly amplifies the measurable bioelectrical effects observed with a single Cube.

The increases observed in both real and imaginary impedance suggest that the opposing Cube configuration influences multiple electrical properties of living cells. Specifically, the results indicate effects on both the movement of electrical current through biological tissues and the accumulation and storage of electrical charge at the cellular membrane. The consistency between the impedance patterns observed with both single and opposing Cube configurations suggests that the dual-Cube arrangement enhances the same underlying bioelectrical response, suggesting that the opposing Cube configuration amplifies the same underlying bioelectrical response observed with a single Cube.

Taken together, the findings provide quantitative evidence that the field generated between two opposing TLS Cubes produces a significantly enhanced bioelectrical response and measurably affects multiple aspects of cellular electrical activity within a relatively short one-hour exposure period.

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