Internationaler Fachverband für BESA I ZVR Nr. 975047937
Jeritzastraße 75, A 4866 Unterach am Attersee I AUSTRIA
Tel.: 0043 - (0)664-73152899 I E- MAIL: office@ifvbesa.at

IFV BESA

EXPERT OPINION

by IFVBESA on Project P50 1.8.3

Magnetic Fields & EMSF in focus

The impact from ProtectPro Smart Defender SD 4

Method

Bioenergy Informative System Analysis (BESA)

(also referred to as a test object in this project)

Client:
IPC GmbH
Heuser
Schulstraße 6
02625 Bautzen
Germany

Projekt participants:

Project management:	Wolfgang Hans Albrecht, President and Project Manager of IFVBESA
Project execution:	Eva Schmidt, President and Deputy Project Manager of IVFBESA
Test subject (Proband):	2 test subjects in the study of quantum entanglement.
Test subjects:	
	1 Test subjects P1
	1 Test subjects P2

Project location: Location 1: International Professional Association for BESA (IFVBESA)
Jeritzastraße 75
A-4866 Unterach am Attersee / Austria

Internationaler Fachverband für BESA I ZVR Nr. 975047937
Jeritzastraße 75, A 4866 Unterach am Attersee I AUSTRIA
Tel.: 0043 - (0)664-73152899 I E- MAIL: office@ifvbesa.at

Date: from May 21, 2026 to May 27, 2026

Project duration: 8 days

Table of Content

	page
1. Fundamentals of Project Creation	04
2. Abstract	06
3. Design for Study P50 1.8.3	09
4. Test Subjects	11
5. Research funding provided by IFVBESA	12
6. General Information on BESA-Testing	14
7. Research Project description	17
8. Expert Opinion	18
9. General Information to the Test-results	20
10. Results of the Study	
11. Authorized Summary	22
12. Overall summary from the perspective of the IFVBESA	23
13. Discussion and Integration of the Study	24
14. Comparative Studies	26

Important information

The client has the right to use this report. Regardless of this, this report constitutes the intellectual property of IFVBESA as the contractor. The contractor is entitled to use this report for other purposes, provided that this does not violate the client's data protection and confidentiality obligations. Apart from this, this report may not be modified or shortened without the consent of IFVBESA, with the exception of the 'authorized summary'. The commission for this project relates to bioenergetically measurable values and their interpretation in accordance with the guidelines of BESA and IFVBESA. Maintaining the quality of the tested products and checking them regularly is the task and responsibility of the client. Investigating the manufacture, mechanism of action or interpretations of the client's products vis-à-vis third parties is not the responsibility or task of the contractor. Video recordings may only be made with the permission of IFVBESA.

Fundamentals of Research Project Design P50 1.8.3

The International Professional Association for Bioenergy-Informative System Analysis was commissioned by IPC GmbH to test the effects of the test object ProtectPro Smart Defender "SD "4 on the respective test subjects in an electric vehicle using bioenergy-informative system analysis (BESA), and to demonstrate its effects on the test subjects.

The testing was conducted independently of the subjective perceptions of all test subjects. According to the commissioning company, the SD 4 product was presented as follows.

Description of the test object ProtectPro Smart Defender SD 4 by the client:

First, it is important to understand that two independent objects can be energetically connected to one another (hyperspace and reference space). This connection or association is referred to as quantum entanglement. Once these two objects are entangled, a change in one object or entity also causes a change in the other—even if they are not in close proximity to one another.

Hyper Space & Reference Space

The eminent German physicist Burkhard Heim (1925–2001) scientifically and mathematically proved that there is energy and matter that we can see, and an informational realm that we cannot see.

He called the energy-matter realm the REFERENCE SPACE and the informational realm the HYPERSPACE.

Reference Space = Energy/Matter Plane => everything that is energy & matter is not information.

Hyperspace = Informational Plane => everything that is information is not energy & matter.

Every Reference Space (energy & matter) has its own corresponding Hyperspace (information). Where the Reference Space ends, Hyperspace begins.

We can see most energy & matter (cars, humans, animals, plants, etc.), with exceptions such as radio waves, terrestrial radiation, cosmic radiation, and electricity. But these too are energy & matter and, although not visible, belong to the so-called energy levels of matter (reference spaces).

In contrast, we cannot see information. Information differs from energy and matter in that it is devoid of energy and matter. Yet information is inherently dynamic. That is to say, it seeks to manifest itself as energy and matter.

The crucial point here is that, through so-called interaction channels via hyperspace (information space), information influences the reference space (energy and matter space)! Thus, hyperspace determines the reference space.

Every energetic object has an identical, informational counterpart in the hyperspace of that same object. Thus, every object simultaneously occupies two spaces: an energetic one (reference space) and an informational one (hyperspace).

Over the years, many engineers and physicists have confirmed the accuracy of Burkhard Heim's theories with the help of supercomputers.

Here are two examples:

1. The electromagnetic radiation from a transmission tower.

This physical frequency in the reference space (even if, in this specific case, it is invisible) has an identical informational frequency in its own hyperspace.

2. A mobile phone

This material, visible object (reference space) has an identical informational counterpart = frequency in its own hyperspace.

Thus, everything that exists has these two spaces: a reference space, which is material and energetic, and a hyperspace, which is immaterial and informational.

The ProtectPro Technology of the test object Smart Defender "SD 4" utilizes the same proven principle.

Application of Protect Pro Technology

In accordance with the previously described concepts of reference space and hyperspace, Protect Pro Technology neutralizes the electromagnetic radiation emitted by 3G, 4G, 5G, and 6G technologies and their applications on the human and animal organism through its various products.

Within the effective range of the respective Protect Pro Technology product, electromagnetic radiation, magnetic radiation, and other technologies that have a negative impact on the biological systems of humans and other living beings are nullified (neutralized or harmonized) at the so-called information level (hyperspace).

The Smart-Defender "SD 4" product represents a technology designed to provide the user with extensive protection against electromagnetic fields (EMF) and magnetic fields.

The "SD 4" device does this in a way that is intended to help to nullifiy (neutralize or harmonize) the EMFs from transmission towers, Wi-Fi, smart meters, monitors, LED light sources, etc., with respect to living organisms/bodies.

In addition, ProtectPro "SD 4" technology is also designed to harmonize 6G electromagnetic radiation.

How Quantum Energy Supports Change

In physics, there is what is known as the principle of inertia, which states:

"A body at rest remains at rest, or a body in motion continues in motion at a constant velocity, unless a force acts upon it or the net force is zero. Similarly, a body in motion continues to move at a constant velocity unless external forces act upon it."

This so-called first law of Newton can therefore be applied just as well to all biological objects as to humans: It is easier to continue doing something consistently than to change, since change requires more energy.

But what happens if you don't have enough energy to change? You get stuck. And that is precisely where the majority of humanity finds itself. They are stuck in old ways of thinking, acting, and living.

This is one of the reasons why meditation, prayer, and other spiritual practices can lead to powerful changes. They connect us to the Source—or, in other words, back to our Source (Origin, the Absolute) through quantum energy.
And thanks to this additional energy, the ”SD 4” product can bring about changes that would previously have been impossible. It is capable of balancing energies, boosting performance, and providing protection against harmful magnetic fields and electromagnetic fields (EMF), for example.

About the Protect Pro SD 4 Technology as a Test Object
The concept behind this test object ProtectPro Smart Defender “SD 4”, hereinafter also referred to as the text object “SD 4”, is to nullify (harmonize and neutralize) disturbances, problems, blockages, and disharmonies in the test subjects’ environment, thereby replacing negative states with positive ones. Due to its mode of operation, the test object offers a simple yet highly effective range of applications.

Abstract on an interdisciplinary perspective

Hypothesis
This study investigates a novel, energy-informative technology that is purported to be capable of harmonizing or largely neutralizing the biological effects of magnetic and electromagnetic interference fields—including those generated by mobile devices in the 5G to 6G frequency range—on the human organism.

Magnetic fields and electromagnetic (interference) fields (EMSF) are increasingly regarded as a potential stressor for biological systems. Studies indicate that they can interfere with cellular communication processes, hormonal control circuits, and neuroendocrine regulatory circuits. The focus is also on the central interface between perception, stress processing, and hormonal regulation.

The aim of this study is to analyze the extent to which a deliberately structured, energy-informative technology “SD 4” can counteract the dysregulations caused by magnetic fields and EMSF in the bioenergy-informative field as well as in physiological and biochemical parameters.

Methodological Approach
Using Bio-Energy-Informative System Analysis (BESA), changes in the energy-informative field coherence, regulatory capacity, and stress levels of test subjects are examined.

These parameters are analyzed in a before-and-after comparison under three experimental conditions:

1. Baseline measurement without specific magnetic and electromagnetic exposure outside the electric car.

2. Exposure to magnetic fields and EMSF (with smartphone 4G/5G/6G field) without energy-informative technology while driving an upper-mid-range electric.
3. Exposure to magnetic fields and EMF (with smartphone 4G/5G/6G field) with energy-informative technology “SD 4” activated while driving an upper-mid-range electric car.

Expected Findings and Significance

It is hypothesized that the technology being tested is capable of reducing magnetic field and electromagnetic field-induced dysregulation in the bioenergetic-informational system while simultaneously exerting nullifying (harmonizing) effects on hormonal and metabolic processes. Preliminary findings (Project P50 1.8) suggest an increase in field coherence, normalization of HPA axis activity, and a decrease in oxidative markers.

The study also aims to contribute to an integrative perspective on technology, consciousness, and bioregulation—an approach that views the material and energy-informational dimensions of life as an interconnected system. By combining insights from quantum physics with bioenergetic diagnostics, a new field of consciousness-based medicine is emerging, in which scientific verifiability and intuitive insight converge.

Research questions addressed in this current project

In this current study, we are investigating the effect of an innovative test object SD 4 on the systemic parameters of the subjects as an indicator of their health. Bioenergy-Informative System Analysis (BESA) is used to detect possible changes in the subjects energy-informative status. Initial results suggest that the tested Protect Pro Technology “SD 4” at least stabilizes the status of the energy-informative system, opens blocked regulatory circuits, modulates inflammatory processes, and promotes a sustainable balance within the organism. The initial results of BESA testing, particularly from Project P50 1.8, show a clear regulation of the energy-informative parameters toward a regulatory behavior. Particularly noteworthy is the observed interaction between the subjects’ emotional stress and their vitality.

The research questions primarily concern the coherent and multidimensional evidence for what IFVBESA has intuitively, theoretically, and through research projects developed and tested over the years in connection with all projects related to this technology.
Is it possible that this technology can intervene deeply in biological, energy-informational, and regulatory processes via entangled fields without applying direct physical stimuli?

This project examines the following hypotheses at various levels:

1. Energetic and bioinformative level

To what extent can bioenergy-informative system analysis (BESA) be used to demonstrate sustainable changes in regulation in test subjects riding in a moving electric car as a result of the applied technology?
What influence or reorganization can relevant informational impulses have on the stress axis and on oxidative and nitrosative processes, etc.?

Does so-called quantum entanglement merely represent a theoretical transmission mechanism, or is it an indication of a practically measurable resonance behavior toward regulation?

2. Neurovascular Level

The neural endothelium is one of the systems most sensitive to stressors. To what extent does Protect Pro Technology Smart Defender “SD 4” make it possible to generate electrical coherence across the entire electromagnetic field of the test subjects?

3. Scientific and Philosophical Level

Is it possible, through the application of Protect Pro Technology Smart Defender “SD 4” and its information field—which is transmitted via quantum entanglement—to reorganize biological structures at the molecular, cellular, and systemic levels?

In summary

Preliminary results suggest that the Protect Pro Technology Smart Defender “SD 4” of the test subject can induce energy-based harmonization, specifically supporting the homeostasis of the stress axis (HPA axis) and promoting regulation and cellular communication.

Project Design

This study is designed as a follow-up to P50 1.8, involving a total of two participants in a specialized study design. The client’s requirement was to test one participant in a state-of-the-art electric vehicle (e-car) and one participant in a state-of-the-art vehicle with a combustion engine (gasoline car).

For this purpose, a hybrid vehicle in the upper mid-range class will be rented, which can be driven in both electric and gasoline modes. To create optimal test conditions (field test), the BESA test station will be installed directly in the vehicle. This makes it possible to collect the measurement data without time delays or data loss, i.e., directly under the influence of the EMF.

The first test series is conducted directly in the electric car; the second test series is conducted in the same vehicle under internal combustion engine conditions (gasoline engine).

This design is structured such that, with the exception of the BESA status test, all other BESA tests are conducted directly within the vehicle.

The objective is to further deepen existing knowledge regarding the potential influence of the test object Protect Pro Technology Smart Defender “SD 4” on magnetic effects and EMF effects in electric vehicles (hereinafter referred to as “e-cars” and “gasoline cars”).

The study is structured as an exploratory design that combines scientific objectivity with an open research dynamic.

The exploratory approach was deliberately chosen to go beyond the framework of classical hypothesis formation and to capture even subtle, previously little-described interactions

and mechanisms of action between bioenergy-informative regulation, influences on consciousness, and processes.

The Bioenergy-Informative System Analysis (BESA) method is used for data collection:

- Bioenergy-Informative System Analysis (BESA) for recording energetic and regulatory changes in the organism's information field

This measurement method allows for a multi-layered analysis of both systemic and energy-informative processes.

By integrating quantum entanglement as a connecting element between the test object and the subject, a research framework is created that incorporates the non-local level of quantum physical interactions into the scientific context.
The P50 1.8.3 project thus exemplifies the IFVBESA approach, which combines classical methodology with consciousness research to gain new insights into regulation, resonance, and quantum-informative effects.

On IFVBESA's Exploratory Research Approach
New knowledge, new insights, and new ideas are the fertile ground on which science and the technologies of the future thrive. The exploratory approach plays a crucial role in most of IFVBESA's research projects and serves as the seed for the information medicine and quantum technology of tomorrow. In exploratory study design, we present a methodological research approach in which research areas or research questions that have not yet been investigated are examined. This demonstrates both the development and the potential of novel approaches for research into future technologies.
The exploratory approach is particularly ideal for new fields of research, such as the effect of a specific technology at the bioenergetic-informational level and its biological processes, because:

- on the one hand, we are breaking new ground where no established models yet exist
- observations are being collected to identify patterns and causal relationships
- new avenues are being opened up that can serve as a foundation for subsequent, confirmatory studies

In Summary:
The approach to this exploratory study is deliberately open-ended, inquisitive, and interdisciplinary. The concrete and practical applicability of IFVBESA further mitigates the otherwise high research risk that often discourages companies and research institutes from engaging with topics at a very early stage of development.

On quantum entanglement:
Quantum entanglement is not a physical connection between particles, but rather a synchronization of information and energy within the field of consciousness. Everything is already connected, not through space and time, but through coherent resonance within a

universal information network. Matter is thus merely a condensed manifestation of this interaction of consciousness (information + energy & matter).
For the current test object “SD 4”, this means: Each test subject receives an energy-informative signature via virtually defined coordinates. This signature forms an energetic-informative imprint in the quantum field and exists as a constant reality at every moment of movement.
It stores the frequency and essence of what is represented by the coordinates and remains stable in the universal information network (hyperspace) as a real excerpt of the reference space (space of consciousness). This creates an energy-informative bridge between the original moment and the current space of consciousness, which remembers and acts independently of space and time.

Test subjects

In addition to the technology of the “SD 4” test object described above, this research project involves at least two test subjects. Additional test subjects will be included as backups in case of unexpected dropouts.

Test subjects will be informed in advance about the general procedures for this project and their role as representatives (see the relevant documents).

For each test subject, the BESA tests will be:

1. At the start of the project, to establish a baseline (current situation).
    - The BESA baseline test is conducted outside the electric car.
2. In the second part of the project, all BESA tests are conducted inside the electric car.
    - BESA-Test 2 takes place directly inside the moving electric car.
      The research question is:
      How does the subject’s energy-informative system behave during the 15-minute ride in the e-car? What deviations are observed compared to BESA Test 1 (the baseline) or outside the e-car?
    - BESA-Test 3 takes place again directly in the moving electric car. After the participant has been in the electric car for 20 minutes, a phone call is also conducted.
      The research question is:
      How does the subject’s energy-informative system behave while driving an electric car and simultaneously talking on a standard smartphone? The smartphone automatically selects the available network (4G / 5G or 6G).
      What differences are observed compared to BESA tests 1 and 2 in the electric car?
    - The BESA Test 4 is again conducted directly in the moving electric car. After the subject has been in the electric car for 35 minutes, a phone call is made,

as in the conditions of BESA Test 3. In addition, the subject takes control of the test object "SD 4". After a 4-minute waiting period (duration of the test object's effect), the BESA test is conducted in the electric car.
The research question is:

- How does the subject's energy-related cognitive system behave while driving the electric car, talking on a neutral smartphone, and being simultaneously exposed to the test object? What differences are observed compared to BESA tests 1, 2, and 3 in the electric car? Can the test object influence the test subject's energy-informative behavior??

3. In the third phase of the project, all BESA tests will be conducted on a premium mid-size gasoline-powered vehicle. All BESA tests will be performed as described in Phase 2.

IFVBESA research support services – BESA reference measurements

Project P50 1.8.3 specifically focuses on verifying the effectiveness of the ProtectPro Technology in test object "SD 4" compared to test subjects 1 and 2 in a modern hybrid vehicle (with a drivetrain that can be switched between electric and gasoline modes).
The test object "SD 4" is being tested in accordance with the client's request and within the framework of the applicable IFVBESA conditions for the awarding of quality seals. In principle, depending on the significance of the test results and taking into account all tests within a project, quality seals are awarded in three categories. For the test object "SD 4", it is to be determined whether its application can nullify (harmonize / neutralize) the aforementioned stresses arising from typical environmental influences and the resulting or existing disturbances, problems, blockages, and disharmonies in the test subjects' energy-informative systems, thereby replacing negative pathological states with positive ones. This will be examined in the following commissioned tests of this project.

General information on BESA testing

Effects of the magnetic field

The human being, as well as all biological objects (also animals and plants) represents a kind of receiving antenna for environmental information. This is because life, especially of human beings, animals and plants depends fundamentally and exclusively on environmental information. Our organism is biologically very sensitive where natural information (fields) are located or where this natural information is subject to interactions and fluctuations. The situation is all the more dangerous when such fields of constructive structures are disturbed by various environmental stresses.

For this reason, detected informative disturbance fields are biologically highly relevant. Any reduction or transformation of these disturbances (ideally to 100 percent) is biologically

very important, often even vital. These informational disturbances from our environment are only compatible with life if they can be readjusted to a natural fluctuation tolerance. Disturbances, problems, blockades, disharmonies in the biological control circuit of humans, especially in animals, find their causes in such disturbing information influences. Bioenergetic examinations in the meridian system of humans or animals therefore belong to the first choice when it comes to questioning the coherent effectiveness of, for example, products in relation to various disturbing fields and information.

Systemic requirements

The tests are carried out according to the guidelines of the international professional association for BESA or the manual for BESA. BESA is used from a systemic, etiological and bioenergetic regulatory point of view. Systemic means that each tested parameter also represents several lower or higher levels and dimensions. Testing on a meridian, such as the lung meridian, primarily provides information about the energetic regulatory behavior within that meridian. In a subordinate sense, the readings of this meridian can provide information about the organic, muscular and emotional levels. In a superordinate sense, dimensions such as the astral plane (4th dimension) and various levels of consciousness (from the 5th dimension). Subsequently, the behavior in the structural, energetic, spiritual, craniosacral structure or dimension is also revealed. The bioenergetic measurements are made by stimulating the energetic potential within the meridians. Measurement voltages average 900 to 1400 mV (millivolts) with a measurement current between 5.5 and 11.25 µA (microamps). The apparent ohmic resistance varies during the measurement process between 0 and 600 kΩ (kiloohm) depending on the instantaneous, energetic state of the person being measured.

Technical device performance

Appropriate technical instrument performance ensures that not only skin resistance is measured during the measurement process, but also the interaction of various factors essential for the regulation of a system. From a physiological point of view, these include ionic current changes in the subcutaneous tissue, electrical potential against the measuring current, instantaneous polarization behavior of the tissue and electrolyte shifts. In addition to the electrophysical tissue properties in the area of the measuring point, the measurement should above all provide information about the regulatory capacity of the control circuit belonging to the measuring point.

Measuring device used: BESA Easy Quick- Check
SN: E 02074N
Labor Silberbauer; 1030 Vienna – Austria, Batterie: 2xNiMH Größe AA; 2,6V, 300mA max.

Measurement tolerances: In principle, fluctuations in measured values can occur, since the machine is operated by people who could specifically have an energetic influence on the measurement results. It is currently the case that only special experts, who have been further trained by the BESA Academy, carry out such tests. The current BESA tests were

personally conducted or performed by Mrs. Eva Krankl as vice president and deputy head of the scientific department of IFVBESA. Certain quality details already programmed in the BESA software provide additional information about when a measurement result deviates from the programmed standards or when a measurement error has occurred by the tester. Another quality feature of BESA tests is that, as a precautionary measure against bias, each specialist must undergo an external examination for the tests. Insofar as the tests of technical (interference) fields show incriminating measurement results, occasional measurement errors of 10 percent could be ignored for such projects. However, experience shows that devices for harmonization of technical interference fields work or they do not work. As a matter of principle, IFVBESA applies the very highest precision according to precisely defined standards in BESA testing. These standards can only be met by professionals with 1000-fold diagnostic experience. Apart from this, electromagnetic (interference) fields acting from outside and possibly influencing the measurement results can be detected by device technology and corrected accordingly.

Measurement procedure:
BESA measurements are taken at "electromagnetically significant" points on the skin. These are partly classical acupuncture points as well as a number of energetically relevant and system-coupled skin areas. By means of electrophysical measurements on anatomically exactly localized skin areas, the following data is recorded

- of the current energetic state in the acupuncture point of the respective meridian
- of the energetic regulation dynamics in the acupuncture point or meridian and its subordinate and superordinate systems and subsystems. This concerns the organ area (subordinate level) as well as the superordinate levels and dimensions of the morphic field of the human organism.

For simplified reading, the scale of BESA is divided into 100 graduation marks, where the scale reading "0 graduation marks" corresponds to a resistance above 600 kilohms and the scale reading "100 graduation marks" corresponds to a resistance of 0 ohms. The scale reading "50 graduation marks" represents 95 kilohms.

The experience of repeated measurements on healthy people, carried out in decades, has shown that the value "50 scale divisions (sct.)" is a physiologically neutral (healthy) reference point. It is "the" outstanding and desirable measurement value and is also called the technical ZERO value.

About the acupuncture point: The anatomical structure of an acupuncture point is formed by a bundle of nerve vessels wrapped in loose connective tissue. Directly at the acupuncture point it pierces the superficial body fascia (Facia corporis superficialis = Fcs). Exactly at this point, the electrical resistance is also lower. Where no Fcs is developed (e.g. in the face, in parts of the head or at the end of the extremities), such a bundle of nerve vessels can also be detected in the acupuncture point. This also applies to the special

conditions along the DuMai meridian (governor or steering vessel at the front of the body) and the RenMai meridian (conception vessel at the back of the body). There, in the point area, the nerve vessel bundles of both sides of the body are interconnected.

Experimental realization and interpretation

The obtained measuring signals at the acupuncture points of the meridians are an expression of the energetic events and the energetic regulation ability of the obtained environmental signals.

The presented BESA standard graphics (see the detailed project descriptions) show the respective energetic regulation behavior within the indicated meridians. The meridians belonging together in each case are represented in so-called form circles or elements. A distinction is always made between the right and the left side. In order to obtain the most differentiated illustration possible, degenerative measured values (energy deficiency) are shown in blue and overheated or inflammatory measured values (energy surplus) in yellow. Optimal measured values are shown in green (50 to 70 scale divisions), whereby the measured value 50 scale divisions is to be aimed at, because it represents a balanced regulatory behavior. Readings that show up in red indicate a deeper deregulation that currently cannot be regulated by the organism. The effect of the tested product on the field or the differences of the regulatory behavior in the organism are represented or documented by differentiated measurements on the respective BESA measurement data sheets.

Research project description

The purpose of this test is to demonstrate the functionality of the test subject using objectively verifiable measurement results, which are precisely outlined in the project design. To this end, the test subjects are first subjected to a BESA status test (BEFORE measurement) outside the hybrid vehicle to determine their initial energy-regulatory state. Subsequently, the further test series (BEFORE and AFTER measurements) are conducted directly in the electric car and gasoline car.

- The BEFORE measurements are taken with the test object outside the vehicle (with the exception of the BESA status test, which is performed outside the vehicle)
- The AFTER measurements are taken with the test object inside the vehicle

The question posed in every POST measurement is: “Is the test object suitable and capable of harmonizing or neutralizing the perceived adverse effects within the state-of-the-art vehicle on the energy-informational systems of the test subjects from the PRE tests?”

The purpose of the specially designed tests is to provide insight by comparing the BEFORE test results—obtained without the test object—with the AFTER-test results obtained by using the test object in the vehicle.

The client's objective is to determine whether the test object, as noted in the product description, is suitable for harmonizing the disturbances, problems, blockages, and disharmonies in the test subjects' meridian system resulting from the BEFORE measurements.

General Information on Information Transmission from the Test Object

Information is transmitted from the test object's Smart Defender "SD 4" hyperspace to the hyperspace of biological objects (humans, animals, plants). From there, the information travels via so-called interaction channels into the reference space or energy space. This is a convergence of, among other things, all organs and forms of energy within the biological object. There, the program's information can dynamically manifest itself and thus alter current states. The changes may manifest as the neutralization or harmonization of disturbances, the resolution of problems, blockages, and disharmonies.

Conditions:

The relevant measurement procedures for the BESA status test are conducted at the IFVBESA facilities under laboratory conditions, at a room temperature of 20°C, on a natural wood floor. The subsequent measurement series are conducted directly in the vehicle in accordance with IFVBESA specifications for field test conditions. In general, test subjects are "switched on" (made ready for testing) prior to the measurement procedures, or the testability of the subjects is assessed accordingly.

Pos.1 BESA-Test 2 Basic (bioenergetic status) on the test subject (at the IFVBESA Institute)

Pos.2 BESA-Test 2 in the vehicle (EMSF without the "SD 4" test object's energy-informative technology.

Pos.3 BESA-Test 3 in the vehicle with the smartphone activated. (EMSF without the "SD 4" test object's energy-informative technology)

Pos.4 BESA-Test 4 in the vehicle with the smartphone activated and with the "SD 4" test object's energy-informative technology

Pos.5 Evaluation of the results within the project and summary in a corresponding report according to the template

Procedure and Guidelines for Implementation

1. **BESA baseline measurements** of the test subjects at all predetermined measurement points (TING points) are used to determine the current status. The results are determined in strict accordance with BESA guidelines and documented using BESA charts.
2. Exposure of the test subjects to EMSF in a vehicle without "SD 4" energy-informative technology.
3.

4. **Activation of the test object**

4.1. When the test object "SD 4" is activated or placed in the measurement circuit, it is applied or activated according to the client's specifications.

4.2. The test subjects are brought into contact with the EMSF and the "SD 4" test object via quantum entanglement. The measurement points mentioned in section 1 are measured in the same order and for the same duration to determine the current energy state. The results are determined exactly according to BESA specifications and documented using BESA graphics.

Expert opinion

The measurement results presented in the project description P50 1.8.3 have shown that after application of the test object "SD 4", **all previously incriminatingly tested toxic information and energetic deregulations could be zeroed or bioenergetically nullified (harmonized) within the specified time frame.** The graphical evaluations of the BESA tests document the results in a **qualitatively comprehensible** way by means of the color-coded measured values. The measured values highlighted in green in the graphic evaluations show as **quantitative effects** a consistently balanced **bioenergetic regulation** in the meridians and thus in all subordinate and superordinate levels and dimensions.

The expert opinion thus confirms the quantitative results in that they are as follows: 1. are ***metrologically significant*** *(meaningful) and 2. are* ***biologically relevant*** *(important or significant).*

Metrological significance of the BESA tests

Significance criteria:

The effects determined in the BESA tests as a result of the bioenergetic resonance behavior, show both in the area of status determination (effect from the area of the existing interference fields through various toxic (environmental) information and the bioenergy-informative interference fields arising from this or subsequently arising body-immanen*t deregulation* as well as after application of the test object "SD 4", changes that are clearly above the specified measurement tolerances. Thus, they are clearly to be classified as significant. According to the criteria of the IFVBESA, all those measurement results are considered significant that allow regulation into the green range.

According to the criteria of the IFVBESA, the BESA measurement values are to be regarded as reliable. The fact that the criteria for the established results are fulfilled could be proven via the BESA tests in this project P50 1.8.3.

Statistical data analysis

Each measurement series can have measurement points where effects remain below the significance threshold (transition areas). A statistical analysis has the advantage of presenting an overall view of the significance of the effects. Exactly these effects are

obtained for seals of approval with 4 or 5 stars. The more extensive the data, the more accurate the statistical analysis.

In the BESA tables and graphs, the statistical characteristics of currently 320 measured values and results were mapped. As can be seen from the BESA graphs, the measured values improved significantly between the BESA pre-measurements and BESA post-measurements. The effects achieved by the test object were confirmed by the BESA measurements on the test subjects.

Biological relevance (importance) of the measurement results and effects
In case of continuous exposure of toxic information (as presented in the project P50 1.8.3) or toxic stress factors, the exposure becomes all the more severe. This is shown by the currently conducted BESA tests on the animal subjects.
In any case, these and similar stress factors pose a serious risk to human and animal salutogenesis.
The test object "SD 4" of the company IPC GmbH bioenergetically examined in this project, - could optimally neutralize the bioenergetically stressing effects and impacts.

The decisive ability of the test object, to harmonize the toxic stress factors tested in the project P50 1.8.3 on the test persons or their transformation into biological information of life-promoting quality is proven by this expert opinion.

General information about the test results

Humans, like all biological entities (including animals and plants), act as a kind of receiving antenna for environmental information. This is because life, especially that of humans, animals, and plants, depends fundamentally and exclusively on environmental information. Our organisms are biologically very sensitive where natural information (fields) are present or where this natural information is subject to interactions and fluctuations. The situation becomes all the more dangerous when such fields of constructive structures are disrupted by various environmental pollutants.

For this reason, detected informational interference fields (including electromagnetic and magnetic fields) are highly relevant from a biological perspective. Any reduction or conversion of these interference fields (ideally to 100 percent) is biologically very important, in some cases even vital. These informational burdens from our primarily artificial environment are only compatible with life if they can be readjusted to a natural tolerance for fluctuations. Disturbances, problems, blockages, and disharmonies in the biological regulatory circuits of biological organisms find their origin in such disruptive informational influences.

Nullifying (neutralizing / harmonizing) effects were demonstrated in this project P50 1.8.3 to determine the effect of the test object on the test subjects. The test object was

able to nullify (neutralize) the biologically adverse effects and the effects of the tested stress factors observed in the test subjects.

The test SD 4 object's significant ability to nullify (neutralize / harmonize) the stress factors tested in this project P50 1.8.3 is hereby demonstrated. The conversion of the tested information into bioenergy information of biological and life-promoting quality is substantiated by this project.

Results of the study

In the BEFORE examinations and tests, all test subjects showed factors or conditions that were more or less stressful. In some test subjects, parameters that deviated significantly from the norm were found, as clearly illustrated by the BESA graphs.

Furthermore, the corresponding comparisons of the evaluations show that influences such as stress, electromagnetic interference fields (EMSF), environmental pollution, or certain stressful life circumstances, such as benzene in this project, were detectable in the BESA 2 tests BEFORE.

The planned study aimed to further investigate these potential effects and shed light on their significance.

The key questions of the research were:

- Can the technology of the test object “SD 4” have a positive, constructive, and life-enhancing influence on the effects of the stress factors BENZENE on the HPA axis (stress and its consequences) and on the reference markers mentioned?
- Is it possible to achieve a measurable reduction in potentially toxic stress through the targeted application of the test object's technology?

These questions lead directly to the presentation of the authorized summary.

Authorized Summary

The BESA tests conducted by IFVBESA on the energetic and physical effectiveness of the test object “SD 4” have clearly demonstrated its ability to nullify (neutralize / harmonize biologically significant stress factors at the acupuncture points of the test subjects. Using the Bioenergy Informational System Analysis, the impact of the aforementioned stress factors on the test subjects, their meridian systems, and their energy-informational-biological regulatory circuits was examined and systematically tested at the energy-informational level. The BESA tests BEFORE-AFTER show significant changes at the tested acupuncture points on the test subject's meridian system. The measurement data and their key figures impressively confirm, on the one hand, the stresses that arise on the human organism from the tested factors, and on the other hand, illustrate how, after application

of the test object, the deregulating energies are transformed into inherent and biocompatible energies.

From a holistic perspective, it can be assumed that the positive effects on the test subjects will also occur in other people. This test, through the BESA before-and-after comparison with the test subjects, clearly demonstrates that a positive influence by the test subject is indeed possible with high precision. All measured values improved significantly from the mostly 100% blue measurement range (including many red measurements) to the green, mostly 50-Skt range (Skt = scale divisions), i.e., the range of optimal measurements. This means: An optimal regulatory dynamic has taken place. In the sense of IFVBESA, one can clearly speak of an optimal, significant improvement in the body's own energy situation.

Results

Before the start of the BESA-AFTER testing, the subjects in the experimental group were exposed to the test object “SD 4” for at least 4 minutes (in conjunction with it). In contrast to the BESA-BEFORE tests, in which the test object “SD 4” was not used, consistently positive regulatory measurement results were observed, indicating that neutralization or harmonization had taken place. The regulatory dynamics developed into an optimal range of effect.

The regulation of the red measurement values with regard to nerves and hormones shows that in this project, almost all hormone parameters are also within the regulatory range.

This indicates a significant improvement in energy-information, which is clearly evident in the BESA-AFTER measurements compared to the BESA-BEFORE measurements.

By demonstrating the energy-informational effectiveness of test ProtectPro Smart Defender SD 4 towards the test subjects towards magnetic fields and electromagnetic fields in this project P50 1.8.3, the requirements for receiving a BESA quality seal from the International Professional Association for BESA were fulfilled.

General summary view by the IFVBESA on the central research

This pilot study provided coherent and multidimensional evidence for what we have been intuitively and theoretically building for years: that quantum technology can intervene deeply in biological, energetic, and regulatory processes via entangled fields without directly applied physical stimuli. For us, these results are impressive and groundbreaking in their entirety. We see several layers in these results that combine to form an interesting overall picture:

1. Bioenergy-Informational Level
The significant BESA regulatory corrections clearly demonstrate that:
The system recognizes the energy-informational impulses and reorganizes itself, even under severe EMF exposure, towards balance.
This is strong evidence that entanglement is not merely a theoretical transmission mechanism, but a practically measurable resonance vector for regulation by the test subject.

2. Neurovascular Level
The nerve endothelium is one of the most sensitive systems to stressors. Its harmonization after the severe exposure (see red values in the hormonal and nervous system area) suggests a return of electrical coherence throughout the bioelectromagnetic field. This is more than homeostasis—in BESA terms, it means coherent synchronization.

3. Scientific and Philosophical Significance
Translating this into the language of research, the new dimension of regulation has once again stabilized and expanded: An information field—mediated via energy-informational programming using Protect Pro Technology and quantum entanglement—can order biological structures at the molecular, cellular, and systemic levels without any classical, physical signal transmission (see Burkard Heim). This further expands and strengthens a bridge that has so far been hardly scientifically proven: *"from energy information via quantum entanglement to biochemical regulation".*

In summary:
These results require a particularly careful publication structure because they touch upon several disciplines, namely biochemistry, biophysics, neurobiology, and systems and consciousness research.

Summary of results and interpretation of the study, in line with the IFVBESA approach

Results and Interpretation
Within the framework of project P50 1.8.3, the effect of the energy-informational test object on exposure factors caused by EMF was investigated. The exploratory pilot study with two subjects showed clear and consistent changes at the bioenergy-informational, biochemical, and cellular levels.

1. Bioenergy-Informative Regulation (BESA)
Significant regulation of previously deregulated measurements was observed in all participants.
After just four minutes, the BESA measurements showed a clear tendency toward bioenergy-informative harmonization and re-centering of the system.
These results suggest that the technical impulses of the entangled field stimulate systemic self-organization, which is reflected in a measurable balance of the bioenergy-informative field.

2. Neurovascular Stability
Of particular note is the significant harmonization of the nerve endothelium, which is considered especially sensitive to oxidative and nitrosative stress. The observed changes indicate a recalibration of electrical coherence, thereby optimizing communication between cells and system levels.

Overview and Interpretation
The results of this pilot study demonstrate that the technology of the test subject SD 4 mediated via quantum entanglement, is capable of harmonizing biological systems simultaneously at multiple levels:

- at the energetic-informational, cellular, and biochemical levels.
- The observed pattern points to a higher-level mechanism in which information acts as an organizing principle.
- By restoring hormonal balance, not only is the antioxidant defense strengthened, but also the system's ability to maintain electrical stability and energetic coherence.

Project P50 1.8.3 thus provides further empirical evidence that energy-information systems, such as the technology of the test object, can initiate non-local regulations in the human organism that are both measurable and biologically verifiable.

Discussion section

The discussion section, as the concluding chapter, combines scientific reflection, energetic-informational insights, and philosophical breadth. The results of the detailed project P50 1.8.3, by not only collecting data but also evoking consciousness, point to a new dimension of biological regulation in which information acts as an ordering and connecting principle between the physical and non-physical levels.

The observed changes in the harmonization of hormone-related processes, from nerve regulation to neurovascular stability, demonstrate that this technology, via the entanglement level, is capable of restoring systemic coherence without the need for direct material intervention.
This finding expands our understanding of biological efficacy. While classical models are based on biochemical reactions and linear signaling pathways, the present results indicate that the organism also responds to non-local informational impulses that stimulate internal self-organization. BESA analyses capture these processes as energetic recentering or systemic reorganization. The simultaneous occurrence of the phenomena mentioned suggests a higher-level mechanism of field-to-cell communication (reference space and hyperspace). The study's results indicate that this technology can recalibrate this delicate balance by introducing coherent information patterns into the system that stimulate its internal ordering capacity. Furthermore, the harmonization of the HPA axis suggests that not only peripheral but also central neuroendocrine control loops can respond to quantum informational impulses.

This opens up perspectives for future research that will further investigate the connection between stress regulation, field resonance, and consciousness.

The pilot study demonstrates that an exploratory study design is also feasible in research using energy-informational and quantum-technological applications when combined with suitable energetic measurement and observation methods. Similar results have already been observed in previous studies over longer observation periods. Therefore, the current findings should be further validated with larger cohorts and longer observation periods to examine the sustainability and reproducibility of the observed effects.

From a philosophical perspective, this project can be interpreted as a further step towards an integral understanding of science, research that does not separate matter and consciousness, but rather understands both as complementary expressions of a shared, informative field. In this sense, this project, at the level of applied research, precisely embodies what inspires it at the level of consciousness: *"the unfolding of a new reality in which humanity, technology, and the field can resonate".*

Comparative-Studies

Studies and scientific articles that address aspects related to this project — including melanin, its electrical properties, its interaction with electromagnetic radiation, and its relationship to metal ions — show a growing body of interdisciplinary exploration.
Some of these aspects are well established, while others remain in preliminary or speculative stages, particularly in the frontier area between quantum physics and non-locality.
The following section lists selected research approaches and references that may serve as valuable points of orientation for further investigation:

Title / Source	**Core Findings**	**Relevance to Project P50 1.8.3**
Melanin-based electronics: From proton conductors to … (ScienceDirect)	Review on melanin in electronic systems – proton and electron conduction, structure–function relationships.	Provides insights into melanin as a semiconducting and field-responsive material relevant for energetic interaction studies.
Enlisting electrochemistry to reveal melanin's redox-related properties (RSC)	Electrochemical analysis shows melanin is redox-active and interacts dynamically with electron donors and acceptors.	Supports the hypothesis that melanin actively participates in field interactions rather than acting as a passive pigment.
Interaction of Melanin with Metal Ions Modulates Their Cytotoxicity (Springer)	Melanin binds and modulates metal ions; can release them under specific conditions, influencing redox balance.	Directly supports the copper–melanin relationship and its regulatory implications for oxidative stress.
Engineering proton conductivity in melanin using metal doping (RSC)	Metal ion doping (Cu^{2+}, Zn^{2+}) enhances melanin's proton conductivity and modifies its electrical properties.	Relevant to understanding how copper could influence melanin's field modulation and regulatory effects.
Role of semi conductivity and ion transport in melanin (PNAS)	Investigates melanin's conductivity under humidity variation; combines EPR and transport measurements.	Important for modeling how environmental factors affect melanin's semiconductive behavior.
Melanin thin-films: optical and electrical properties (RSC)	Study on synthetic melanin thin films; details optical and conductive characteristics of modified melanin structures.	Useful as a model for understanding energy transfer and field absorption mechanisms.
Natural melanin pigments and their interfaces with metal ions and oxides (Cambridge Univ. Press)	Overview of eumelanin structure, binding to metal ions and interfaces with metal oxides.	Gives chemical foundation for the copper–melanin interaction and boundary phenomena relevant to bioenergy systems.
Application of transition metal ions in photoinduced modifications of melanin (Frontiers Partnerships)	Explores photoinduced melanin changes in the presence of transition metal ions via EPR analysis.	Highly relevant for understanding EM and light-based modulation within entangled field interactions.

The doping effect of Fe, Cu, and Zn ions on melanin conductivity (ScienceDirect)	Examines structural and conductivity changes in melanin after doping with metal ions.	Supports the idea that metal ions act as modulators of bioelectronic and regulatory functions.
Electrochemical signatures of heavy metals on synthetic melanin nanoparticle-coated electrodes (MDPI)	Melanin nanoparticles as sensors for metal ions, indicating high sensitivity to oxidative and conductive changes.	Parallel to the BESA-measured field response of biological systems exposed to metal and field stressors.

Some relevant studies and research findings

Topic	Study / Article	Summary / Relevance	Note / Link
Electrical Properties of Melanin	*Role of semiconductivity and ion transport in the electrical behavior of melanin*	Melanin exhibits electrical conductivity, photoconductivity, and ion transport; interesting parallels to Project P50 1.8.3 (PMC)	PMC
The Effect of Copper on Melanin	*The effect of copper on eumelanin photophysics and morphology*	Investigates how copper influences the shape, photophysics, and aggregation of eumelanin. (ResearchGate)	ResearchGate
Metal Ions and Melanin Instability	*Interaction of Melanin with Metal Ions Modulates Their Degradation*	Shows that metal ions such as copper and iron can accelerate the degradation of melanin, which is relevant in terms of dysregulation caused by "incorrect" metal exposure. (SpringerLink)	SpringerLink
Radiation & Melanin	*Ionizing Radiation Changes the Electronic Properties of Melanin*	Shows that ionizing radiation can alter the electronic properties of melanin. (PLOS)	PLOS
Electromagnetic Fields & Melanin Production	*Exposure to Radiofrequency Electromagnetic Fields Enhances Melanin Synthesis*	In cell cultures, RF-EMF exposure led to increased melanin expression levels. (PMC)	PMC
Applications in Materials Science	*Heat treatment turns melanin into an electrical conductor*	Thermal treatment can significantly increase the conductivity of eumelanin, which is interesting when considering how melanin can be altered by "external" influences. (physicsworld.com)	
Optical / Electrical Properties	*Electrical and optical properties of natural and synthetic melanin*	Comparative measurements of conductivity and optical parameters in synthetic and natural melanin. (ScienceDirect)	

Evaluation & Limitations

- Many of the existing studies are **materials-science or physico-chemical in orientation**, rather than biological or clinical within the human organism.
- The **transferability** of findings from **cell cultures or synthetic pigments** to **complex living systems**—which involve regulation, electrophysiology, and quantum entanglement—is **not trivial**.
- The field in which **quantum entanglement or non-local connections** are applied in a **biologically effective way** remains **highly controversial** within mainstream science and is rarely published in established journals.
- Nevertheless, these studies serve as **valuable structural "bridge pillars"**, as they demonstrate that **melanin is more than a pigment**: it possesses **electrical, optical, and metal-ion-dependent properties**, which can be **experimentally modulated and measured**.

Recommended Approach & Contacts

- Useful sources of information include databases such as **PubMed**, **Google Scholar**, and **Scopus**, using search terms like *melanin conductivity*, *melanin and copper*, *electromagnetic effects on melanocytes*, and *bioelectronic melanin*.
- **Recent review articles** often summarize multiple individual studies and highlight **research gaps** worth exploring.
- Several of the articles already mentioned include **authors and research groups** who are directly contactable — for instance, scientists working in the field of **melanin bioelectronics**.
- **Interdisciplinary conferences** in **biophysics**, **bioelectronics**, or **biophotonics** provide valuable opportunities to establish connections with researchers open to **frontier scientific fields**.

Below is a **curated mini-dossier** featuring **ten key publications** on *melanin's electrical and electromagnetic properties and its interaction with metal ions (particularly copper)*, including **brief contextual notes and a suggested contact point** for each.

1. **Dadachova et al., 2007 — PLOS ONE**
   Ionizing Radiation Changes the Electronic Properties of Melanin…
   Shows that ionizing (and non-ionizing) radiation alters the electronic properties of melanin; melanized fungal cells grew faster under radiation.
2. **Contact:** Corresponding author listed on the article page: Ekaterina Dadachova (email address provided there). (PLOS)

3. **Mostert et al., 2012 — (Open-access auf PMC)**
   Role of semiconductivity and ion transport in the electrical behavior of melanin
   Basic research: Melanin's conductivity depends heavily on moisture and ions; this explains why it is "conductive when wet."
   Contact: Research group led by **A. B. Mostert / P. Meredith** (Materials Physics/Bioelectronics). (PMC)

4. **Migliaccio et al., 2019 — Frontiers in Chemistry**
   Evidence of Unprecedented High Electronic Conductivity in Eumelanin
   Thermal annealing drastically increases eumelanin conductivity (up to ~318 S/cm)—a key factor in understanding electronic transport pathways.
   Contact: Correspondence address listed on the Frontiers website (authors based in Italy; materials science). (Frontiers)

5. **Ligonzo et al., 2009 — Journal of Non-Crystalline Solids**
   Electrical and optical properties of natural and synthetic melanin
   Comparison of natural and synthetic melanins: optical, electrical, and photoelectric measurements.
   Contact: Institute/Authors via the publisher's website (Sciencedirect/ADS Abstract). (ScienceDirect)

6. **Kim et al., 2024 — (PubMed/PMC)**
   Exposure to RF-EMFs Enhances Melanin Synthesis via p53 in Mel-Ab Melanocytes
   RF-EMF (1760 MHz, SAR 4 W/kg) increased melanin production in melanocytes; the p53 signaling pathway was activated.
   Contact: Corresponding Author auf PubMed/Artikel-PDF (Dermatologie/Biophysik in KR). (PubMed)

7. **Birch & Sutter, 2013 — SPIE Proc.**
   The effect of copper on eumelanin photophysics and morphology
   Copper alters the self-organization/aggregation and photophysics of eumelanin.
   Contact: D. J. S. Birch, Photophysics Group, University of Strathclyde (correspondence in the SPIE PDF). (spiedigitallibrary.org)

8. **Zadlo et al., 2017 — Cellular and Molecular Biology (Springer)**
   Redox Active Transition Metal Ions Make Melanin Susceptible to Chemical Degradation
   Cu/Fe accelerate the oxidative degradation of melanin; the mechanistic basis for metal stress.
   Contact: T. Sarna / A. Zadlo (Biophysics, Krakow) via the Springer website. (SpringerLink)

9. **Sarna et al., 2022 — Journal of Solution Chemistry**
   Interaction of Melanin with Metal Ions Modulates Their Degradation
   EPR/UV-Vis/AFM data: Metal ion binding (including Cu and Fe) modulates melanin stability and degradation.
   Contact: Corresponding authors via the Springer website. (SpringerLink)

10. **Mostert et al., 2021 — (Review, open-access)**
    Melanin, the What, the Why and the How
    Overview of the redox properties, electron transfer, and functional aspects of melanin.
    Contact: Authors/institutions via PMC/article PDF. (PMC)

11. **PhysicsWorld (News, 2019) + Primärstudie (Frontiers, s. #3)**
    Heat treatment turns melanin into an electrical conductor
    A popular science explanation of how annealing increases conductivity; ideal for beginners and media contacts.
    Contact: For research inquiries, contact #3 (Frontiers) directly; the article links to the research group. (physicsworld.com)

Clear classification for the hypothesis (melanin-copper EM stability)

- #6, #7, #8 support **the copper lever** (photophysics, aggregation, tendency to degrade).
- #1, #3, #4, #5, #9 demonstrate **electronic/EM interactions** of melanin.
- Together, this forms a solid body of literature supporting your connection: **copper deficiency => melanin dysregulation => electromagnetic/electrical instability.**

Studies & Reviews – View the study or abstract

1) EEG & HRV under RF-EMF/5G

- **EEG/HRV under 5G smartphone exposure (with/without intervention)** – Single-subject study with N = 10, 30-minute exposure to iPhone 15 Pro; reports increases in beta/gamma activity and a reduction in HRV, as well as attenuation (exploratory, small sample size). (ifqtf.org)
  https://ifqtf.org/wp-content/uploads/2025/04/DSGIP_EEG_HRV_IPhone15pro_Quantum_Upgrade_2025-04-22_eng-1.pdf?utm_source=chatgpt.com

- **Systematic review on RF-EMF and cardiac activity/HRV (BEMS/Wiley) –** compiles human studies on HR/HRV under RF-EMF. (Wiley Online Library)

  https://onlinelibrary.wiley.com/doi/pdf/10.1002/bem.70014?utm_source=chatgpt.com

- **Randomized crossover study: Mobile RF and resting EEG –** methodologically sound approach (double-blind, counterbalanced). (doris.bfs.de)
  https://doris.bfs.de/jspui/bitstream/urn%3Anbn%3Ade%3A0221-2024121749259/1/SL_VanderMeer_2023_EffectsOfMobile_Eng.pdf?utm_source=chatgpt.com

Benefit: Demonstrates the validity of selecting **EEG bands (Theta/Alpha/Beta/Gamma)** and **HRV parameters (SDNN, RMSSD, HF/LF, LF/HF)** as sensitive endpoints.

2) Oxidative stress (context for 5-HMF)

- **WHO-WHO-commissioned systematic reviews on oxidative stress under RF-EMF –** comprehensive analysis (animal/cell studies, with some human data included in the series), methodologically rigorous. (ScienceDirect)
  https://www.sciencedirect.com/science/article/pii/S0160412024005269?utm_source=chatgpt.com

Classification of 5-HMF: 5-HMF is a **plausible oxidative marker**, but direct human data specifically regarding RF-EMF are scarce; therefore, its use as an **exploratory biomarker** can be justified in light of the WHO reviews on "oxidative stress markers."

3) α-Ketoglutaric acid (AKG) – an energy and antioxidant marker

- **Human evidence (cardiology):** Correlations between AKG and oxidative stress/prognosis (demonstrating its relevance as a metabolic marker). (Frontiers)
  https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2025.1544537/full?utm_source=chatgpt.com

- **Experimental (neuro/aging models):** AKG attenuates oxidative stress, improves mitochondrial function (mechanism). (MDPI)
  https://www.mdpi.com/1424-8247/18/8/1080?utm_source=chatgpt.com

Benefit: Justifies **AKG** as a **cellular energy status/mitochondrial proxy** in the EMF context (as an a priori hypothesis; causality with EMF remains to be demonstrated).

4) Melatonin & the circadian axis (including HPA axis)

- **Review:** EMF, melatonin, sleep/EEG – An overview of effects on melatonin secretion and sleep architecture. (ScienceDirect)
  https://www.sciencedirect.com/science/article/abs/pii/S1087079219300073?utm_source=chatgpt.com
- **Recent review article (MDPI/Biomolecules):** Melatonin, electromagnetic fields, and physiological effects. (MDPI)
  https://www.mdpi.com/2218-273X/14/8/929?utm_source=chatgpt.com
- **HPA axis – background text (rhythms/cortisol:** for protocol justification of measurement times). (ScienceDirect)
  https://www.sciencedirect.com/science/article/abs/pii/S1521690X17301094?utm_source=chatgpt.com

Benefit: Supports the selection of **melatonin** (and **cortisol/HPA**) as **time-sensitive** markers → for consistent measurement (e.g., late afternoon/evening) to minimize circadian confounders.

5) 5) Melanin & EMF / Radiation Interaction

- **Review of melanin–radiation interactions (fundamental to applied):** absorption, redox, material properties. (scholars.northwestern.edu)
- **RF-EMF promotes melanogenesis in melanocytes (1760 MHz) –** increase in melanin production in cell models (in vitro). (MDPI)
  https://www.mdpi.com/1422-0067/25/22/12457?utm_source=chatgpt.com
- **Metal-modified melanin –** optical/redox properties (demonstrates binding/protective potential). (ScienceDirect)
  https://www.sciencedirect.com/science/article/pii/S2405844024053180?utm_source=chatgpt.com

Benefits: Establishes **melanin** as a **frequency-/light-sensitive biomarker** with a potential protective/resonance role; direct human EMF data are limited → declare as a **hypothesis axis.**

6) 5G/mmWave – General Overview

- **Sensors Review 2025:** Effects of higher-frequency mmWaves (5G), shallow penetration depth, potential indirect effects. (MDPI)
  https://www.mdpi.com/1424-8220/25/9/2749?utm_source=chatgpt.com
- **WHO program "RF-EMF Systematic Reviews" –** protocols (including tinnitus/migraine) → presents the current state of the evidence. (doris.bfs.de)
  https://doris.bfs.de/jspui/bitstream/urn%3Anbn%3Ade%3A0221-2024042443254/4/SL_WHO-Systematic-Reviews_2024_Deu.pdf?utm_source=chatgpt.com

Benefits: Provides context for our 5G framework; highlights the current state of research and open questions.

- **Primary endpoints:** EEG power spectra (Θ/α/β/γ) + HRV (SDNN, RMSSD, HF/LF, LF/HF). (rationale: see abovre) (Wiley Online Library)
  https://onlinelibrary.wiley.com/doi/pdf/10.1002/bem.70014?utm_source=chatgpt.com
- **Secondary/Exploratory Biomarkers:** Melatonin (saliva/plasma; evening), cortisol (HPA), AKG, 5-HMF, copper (serum; optionally ceruloplasmin). (Rationale: oxidative stress, mitochondria, circadian axis.) (ScienceDirect)
  https://www.sciencedirect.com/science/article/pii/S0160412024005269?utm_source=chatgpt.com

- **Timing:** Circadian standardization (constant time of day, document fasting status/last meal). (Rationale: HPA/melatonin rhythms.) (ScienceDirect) https://www.sciencedirect.com/science/article/abs/pii/S1521690X17301094?utm_source=chatgpt.com
- **Design:** Randomized, double-blind, crossover (no EMF / EMF / EMF + intervention), 20–40 min exposure, washout, artifact control (EOG/EMG). (Methodology reference: EEG/HRV studies above.) (doris.bfs.de) https://doris.bfs.de/jspui/bitstream/urn%3Anbn%3Ade%3A0221-2024121749259/1/SL_VanderMeer_2023_EffectsOfMobile_Eng.pdf?utm_source=chatgpt.com

Rationale & Endpoints

In this study, electromagnetic fields (EMFs), particularly those emitted by 5G smartphones (6G), are considered potential stressors of the biological system. Various human studies and meta-analyses show a significant reduction in heart rate variability parameters (e.g., SDNN, SDANN, pNN50) under EMF exposure. (De Gruyter Brill)

Studies on the interaction of EMF with melatonin secretion and sleep rhythms suggest that electromagnetic fields influence circadian regulation and antioxidant processes. (ScienceDirect)

Thus, HRV (as an indicator of the autonomic nervous system and stress regulation), melatonin (circadian & antioxidant regulation), and other biochemical markers such as copper, 5-hydroxymethylfurfural (5-HMF), and α-ketoglutaric acid (AKG) to be suitable endpoints for evaluating the bioenergetic-informative effect of a quantum-based technology designed to neutralize EMF effects.

Primary endpoints:

- HRV time-domain and spectral parameters (SDNN, RMSSD, HF, LF, LF/HF)
- EEG power densities in the theta, alpha, beta, and gamma bands (central, temporal, parietal, and occipital regions)
- Melatonin (plasma/saliva) and cortisol (HPA axis) levels

Exploratory markers:

- Copper (serum) – as a trace element involved in antioxidant and neuronal regulation
- 5-HMF – as an indicator of oxidative/nitrosative stress
- AKG – as an indicator of cellular energy status