

Saint-Petersburg Electrotechnical University «LETI»

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X RUSSIAN-GERMAN CONFERENCE ON BIOMDICAL ENGINEERING

第十屆俄羅斯—德國生物醫學工程會議

EVALUATION OF THE EFFECTIVENESS OF USING AIRES SHIELD ELECTRONIC ANOMALY NEUTRALIZERS TO
REDUCE THE NEGATIVE INFLUENCE OF A CELLULAR PHONE'S ELECTROMAGNETIC FIELD

評估使用 AIRES SHIELD 電子異常中和器以減少手機電磁場負面影響之有效性

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Abstract 摘要

Research was conducted to evaluate the effectiveness of using Aires Shield electromagnetic anomaly neutralizers to reduce the negative influence of the electromagnetic field caused by the operation of a cellular phone, on the brain's bioelectrical activity. 11 human subjects were tested, each of which participated in two experiments: a baseline study (using a mobile phone without an Aires Shield) and the main study (using a mobile phone with an Aires Shield). A mobile phone operating on the GSM-900 standard was used. In order to record the brain's bioelectric activity, a Mizar 19-channel computerized electroencephalogram machine using 16 monopole electrodes in accordance with the internationally-recognized 10-20 system. The behavior of the relative strength of the rhythms of the brain's bioelectric activity with and without an Aires Shield was compared. The research has demonstrated that the elevation of the relative strength of theta and alpha rhythms, which are manifest when using a mobile phone on the side exposed to the mobile phone, without using an Aires Shield are virtually absent when it is used. Therefore, using an Aires Shield when working with mobile phones operating on the GSM-900 standard inhibits electromagnetic radiation from interacting with the brain's own bioelectric activity on the frequencies of the alpha- and delta rhythms, which may be regarded as a protective effect.

研究旨在評估使用 Aires Shield 電磁異常中和器，是否能減少行動電話運作所產生電磁場對大腦生物電活動的負面影響。對 11 名受試者進行測試，每人參與兩項實驗：基線研究（使用未裝置 Aires Shield 的行動電話）及主要研究（使用裝有 Aires Shield 的行動電話）。所使用的行動電話為 GSM-900 標準機種。為了記錄大腦的生物電活動，採用一台 Mizar 19 通道電腦化腦電圖機，使用符合國際公認 10-20 系統的 16 個單極電極。比較了有無 Aires Shield 時，大腦生物電活動節律相對強度的變化。研究顯示，當使用未裝 Aires Shield 的行動電話並置於受影響一側時，theta 與 alpha 節律的相對強度會上升；而在使用 Aires Shield 時，此類上升幾乎不存在。因此，在使用採用 GSM-900 標準的行動電話時配戴 Aires Shield，可抑制電磁輻射在α波與δ波頻率上與腦部自身生物電活動的相互作用，這可被視為一種保護效果。

Keywords: bioelectric activity of the brain, mobile phone, electroencephalography, Aires Shield neutralizers, electromagnetic radiation.

關鍵詞：腦部生物電活動、行動電話、腦電圖、Aires Shield 中和器、電磁輻射。

Introduction. In Europe and the United States, the adopted standards for determining SAR (Specific Absorption Rate) levels from cellular phone radiation are based solely on the thermal effect, which is only associated with the heating of the tissues of the human body. However, a number of works have discussed the presence of an informational effect [1, 2, 4]. The GSM-900 mobile phone standard transmits information using impulses that are joined into blocks. The duration of a single block is 4.616 ms, which establishes the frequency of the mobile phone's impulses at approximately 217 Hz (1/4.616). Blocks of impulses between a mobile phone and a base station are grouped into multiblocks, consisting of 26 repetitions. Thus, the second frequency emitted by a mobile phone is 8.35 Hz (217/26). Certain types of cellular phones operating in an energy-conserving mode may also generate a third frequency: 2 Hz [3, 5].

引言。在歐洲與美國，用以判定行動電話輻射之 SAR（比吸收率）標準，僅基於熱效應，即僅與人體組織之加熱有關。然而，若干研究討論了資訊效應的存在[1, 2, 4]。GSM-900 行動電話標準以脈衝傳輸資訊，脈衝被組成區塊。單一區塊的持續時間為 4.616 毫秒，這確定了行動電話脈衝的頻率約為 217 Hz（1/4.616）。行動電話與基站之間的脈衝區塊被編組為多區塊，由 26 次重複組成。因此，行動電話發射的第二個頻率為 8.35 Hz（217/26）。某些在省電模式下運作的特定類型行動電話，亦可能產生第三個頻率：2 Hz[3, 5]。

The danger of such an informational effect from mobile phones is that the frequencies mentioned above can interact with the brain's own electroencephalographic activity. The frequency 217 Hz may resonate with the brain's gamma rhythm, the frequency 8.35 Hz - with the alpha rhythm, and 2 Hz - with the delta rhythm. Thus, when using a mobile phone, signals are transmitted into the human brain, which are capable of interacting with the brain's own

來自行動電話的此類資訊性效應的危險在於，上述頻率可能會與大腦自身的腦電活動發生相互作用。217 Hz 的頻率可能與大腦的伽瑪節律產生共振，8.35 Hz 的頻率則可能與阿爾法節律共振，而 2 Hz 則可能與德爾塔節律共振。因此，當使用行動電話時，會有訊號傳入人體大腦，這些訊號能與大腦自身的

bioelectric activity, thereby disrupting its function. This makes it important to protect the human brain when using a mobile phone.

生物電活動互相作用，從而破壞其功能。這使得在使用行動電話時保護人類大腦變得重要。

Aires Shield electromagnetic anomaly neutralizers may be considered one form of protection. They are a universal three-dimensional Fourier filter. As a result of an electromagnetic field interacting with the Aires Shield, the field undergoes a structural transformation that may cancel out the influence of the frequencies that resonate with the human brain (217 Hz, 8.35 Hz, and 2 Hz), which occur when using a cellular phone.

Aires Shield 電磁異常中和器可被視為一種保護形式。它們是一種通用的三維傅立葉濾波器。當電磁場與 Aires Shield 相互作用時，該場會經歷結構上的轉變，這種轉變可能抵消在使用手機時出現並與人類大腦共振的頻率（217 Hz, 8.35 Hz，以及 2 Hz）的影響。

Research objective. To evaluate the effectiveness of using Aires Shield electromagnetic anomaly neutralizers to reduce the negative influence of the electromagnetic field caused by the operation of a cellular phone, on the brain's bioelectrical activity.

研究目的。評估使用 Aires Shield 電磁異常中和器，是否能降低行動電話運作所產生的電磁場，對大腦生物電活動之負面影響。

Methodology. 11 men (ages 18 to 22 years) participated in the study. Each subject participated in two experiments: a baseline study (using a mobile phone without an Aires Shield) and the main study (using a mobile phone with an Aires Shield).

方法。11 名男性（年齡 18 至 22 歲）參與本研究。每位受試者參與兩次實驗：一為基線研究（使用未配備 Aires Shield 的行動電話），另一為主試驗（使用配備 Aires Shield 的行動電話）。

The research was conducted in the morning in a room with an air temperature of 20°C. The recording procedure was an uninterrupted 40 minutes long and included the following stages:

研究於上午在一間空氣溫度為 20°C 的房間內進行。記錄程序為不間斷的 40 分鐘，包含下列階段：

Recording a baseline EEG at rest (a state of calm wakefulness).

記錄基線腦電圖於安靜休息時（平靜清醒狀態）。

Recording an EEG with a mobile phone in standby mode held next to the ear (3 minutes).

在待機模式下將手機貼近耳朵記錄腦電圖（3 分鐘）。

Recording an EEG with a mobile phone in call mode held next to the ear (no audio, 3 minutes).

在通話模式下將手機貼近耳朵記錄腦電圖（無音訊，3 分鐘）。

Recording an EEG with a mobile phone in talk mode held next to the ear (no audio, 5 minutes).

在通話中模式下將手機貼近耳朵記錄腦電圖（無音訊，5 分鐘）。

Recording an EEG 3, 5, and 10 minutes after turning off the phone.

關機後 3、5 及 10 分鐘各記錄一次腦電圖。

The subjects were sitting in a darkened, soundproof room while the EEGs were recorded.

受試者坐在昏暗且隔音的房間內，同時進行腦波（EEG）記錄。

A mobile phone operating on the GSM-900 standard was used.

使用一支採用 GSM-900 標準的行動電話。

When performing the electrophysiological exam, the brain's bioelectric activity was recorded by a Mizar 19-channel computerized electroencephalogram machine using 16 monopole electrodes in accordance with the internationally-recognized 10-20 system in the 0-70 Hz transmission band with 250 Hz frequency discretization. Unpolarized silver chloride electrodes were placed symmetrically in the areas of the prefrontal (Fp1, Fp2), postfrontal (F3, F4), inferior (F7, F8), central (C3, C4), middle temporal (T3, T4), posttemporal (T5, T6), parietal (P3, P4), and occipital (O1, O2), areas, with joined reference electrodes being placed on the earlobes. The electrodes were fastened under the bands of a special headpiece. To improve their impedance, the electrodes were soaked in a saline solution and the attachment sites were treated

在進行電生理檢查時，使用 Mizar 19 通道電腦化腦電圖機，以 16 個單極電極按照國際公認的 10-20 系統，在 0-70 Hz 傳輸頻帶、250 Hz 取樣頻率下紀錄腦部生物電活動。未極化的氯化銀電極對稱地放置於前額（Fp1、Fp2）、前額後方（F3、F4）、下側額（F7、F8）、中央（C3、C4）、中顳（T3、T4）、顳後（T5、T6）、頂葉（P3、P4）和枕葉（O1、O2）區域，連接參考電極則置於耳垂。電極固定於特殊頭套的帶子下。為改善阻抗，電極以生理鹽水浸潤，且電極附著處經過處理。

with alcohol. A 50 Hz band-stop filter with a 0.1 Hz stop band was used during the processing of the recordings.

以及酒精。訊號處理時使用了一個 50 Hz 的帶阻濾波器，阻帶寬度為 0.1 Hz。

The software program Win EEG was used to analyze the artifact-free portions of the EEGs. The multi-channel EEG pattern was analyzed using rhythm topography (color mapping), the numeric values of which were determined using a table of indices (the indices of the EEG's main rhythms were determined as the ratio of the time a particular rhythm was present to the entire EEG recording time, expressed as a percentage) and the top frequency in each of the main EEG ranges across the 16 leads. The following frequency ranges were examined: the delta rhythm (0.5 - 3 Hz), Θ (4-7 Hz), α (8 - 13 Hz), β_1 (14 - 25 Hz), β_2 (26 - 35 Hz), γ (36 - 50 Hz).

使用軟體程式 Win EEG 分析無人工雜訊的腦電圖片段。多通道腦電圖以節律拓撲（色彩映射）進行分析，其數值由指數表決定（腦電圖主要節律的指數被定義為該節律出現時間與整段腦電圖紀錄時間之比，並以百分比表示），以及在 16 個導聯中每個主要腦電圖頻段的最高頻率。檢視的頻率範圍如下：delta 節律（0.5 - 3 Hz）、 Θ （4-7 Hz）、 α （8 - 13 Hz）、 β_1 （14 - 25 Hz）、 β_2 （26 - 35 Hz）、 γ （36 - 50 Hz）。

A qualified visual analysis of the EEG was employed to isolate the analysis period with a duration from 0.2-1 second. The periods free from oculogyric and muscular artifacts were sampled at random over the entire duration of the EEG recording.

採用合格的腦電圖視覺分析來篩選出分析時段，該時段持續時間為 0.2 至 1 秒。整段腦電圖記錄中，隨機抽取沒有眼球轉動與肌電雜訊的時段進行取樣。

80-100 EEG fragments were analyzed at all of the stages of measurement in each EEG recording.

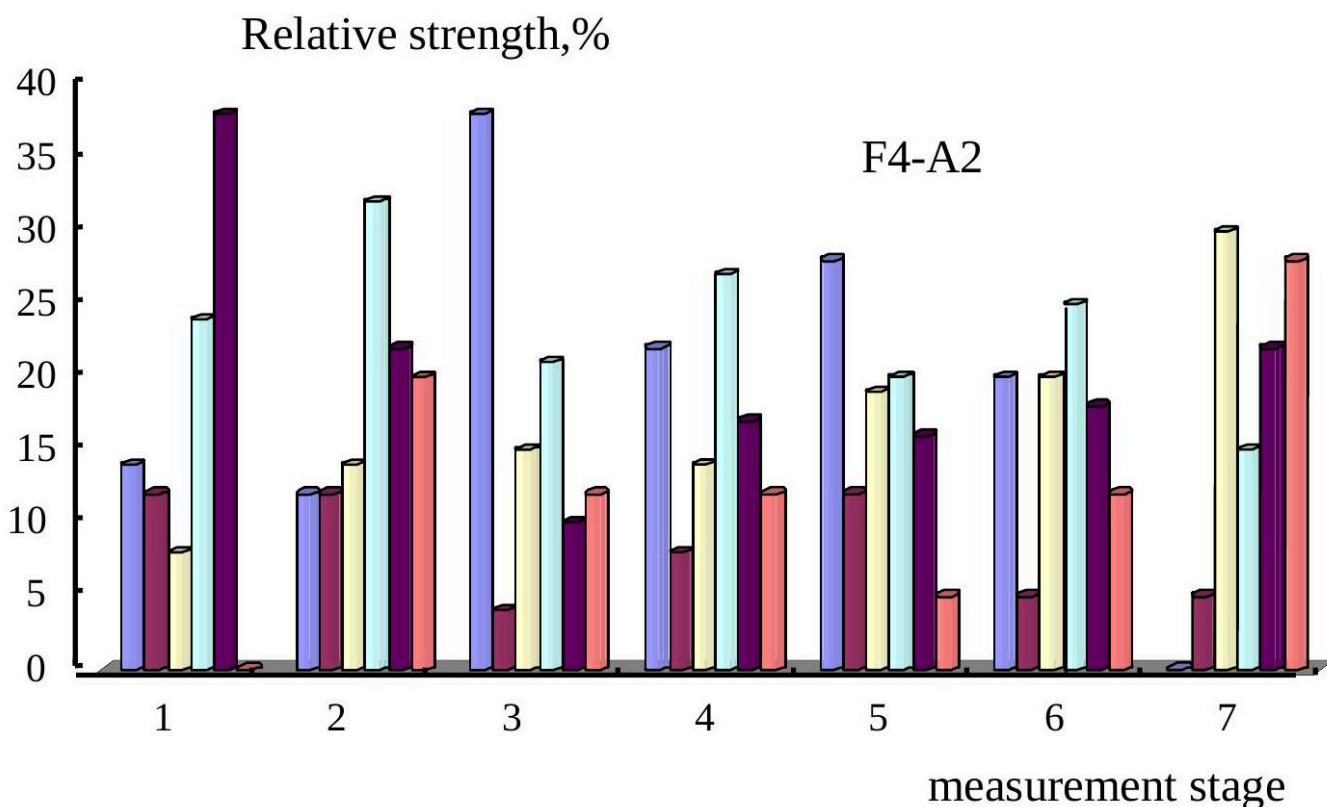
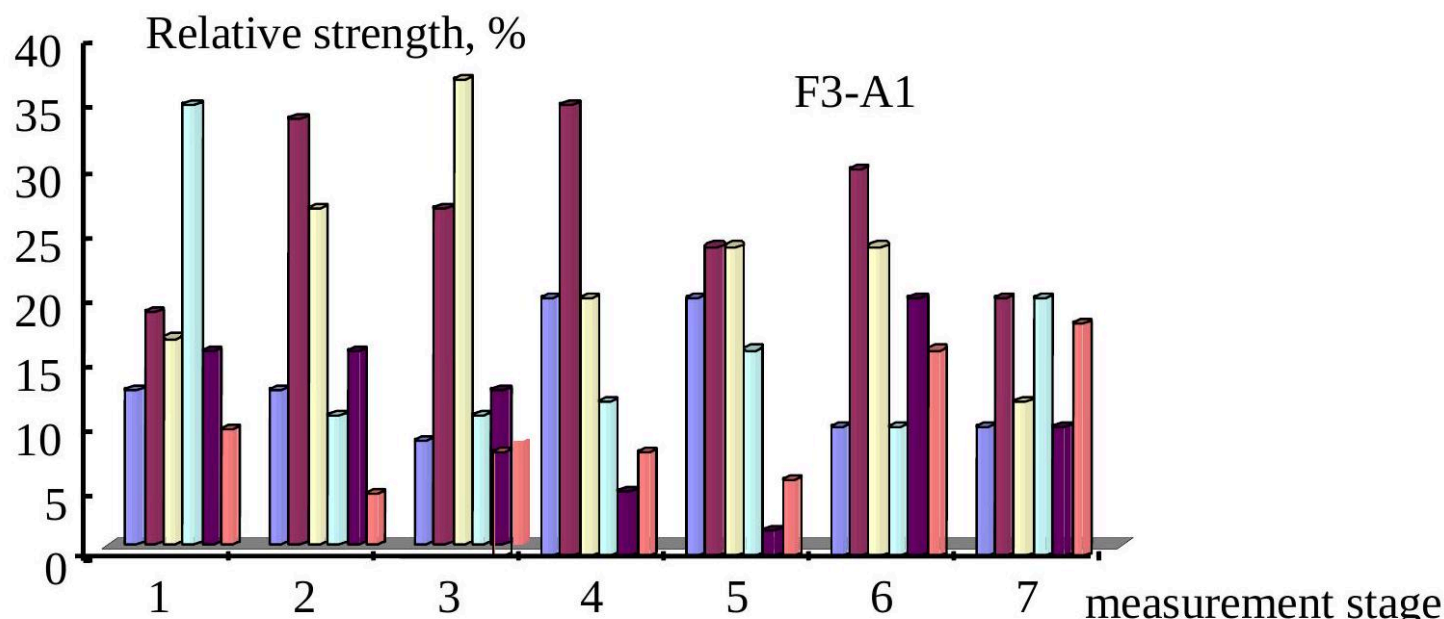
在每次腦電圖記錄的所有測量階段中，各分析了 80 到 100 段腦電片段。

Results. The distribution of the relative strength of the delta, θ , α , β_1 , β_2 , and γ rhythms was determined for the EEG in the frontal, temporal, central, parietal, and occipital leads.

結果。於額葉、顳葉、中央、頂葉及枕葉導聯中，決定了 **delta**、 θ , α , β_1 , β_2 與 γ 節律相對強度的分佈。

The substantial change of the spectral characteristics of the EEG rhythms is conspicuous under the influence of a mobile phone in virtually all of the left leads examined. The most typical was the increase of the relative strength of the delta and alpha rhythms, especially the increase observed in the third and fourth stages of measurement, which confirms the data obtained by other experiments. When using the electromagnetic anomaly neutralizers, no increase in the relative strength of the rhythms was detected. Figures 1 and 2 illustrate this pattern in the EEG's frontal lead.

在幾乎所有檢測的左側導聯中，移動電話影響下腦電波頻譜特性的顯著改變都十分明顯。最典型的是 δ 波與 α 波相對強度的增加，尤其是在第三與第四測量階段觀察到的增強，這也驗證了其他實驗所得的資料。當使用電磁異常中和器時，並未檢測到波形相對強度的增加。圖 1 與圖 2 在腦電圖的額葉導聯中說明了這一模式。



theta rhythm;
 delta rhythm;
 alpha rhythm;
 beta-1
 beta-2 rhythm;
 gamma rhythm

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Figure 1: Key: 圖 1：說明：

Recording of a baseline EEG at rest. 2. Recording an EEG with a mobile phone in standby mode held next to the ear. 3. Recording an EEG with a mobile phone in call mode held next to the ear (no audio). 4. Recording an EEG with a mobile phone in talk mode held next to the ear (no audio). 5-7. Recording of an EEG 3, 5, and 10 minutes after turning the phone off.

1. 在休息狀態下記錄基線腦電圖（EEG）。2. 將手機處於待機模式並貼近耳邊時記錄腦電圖。3. 將手機處於通話模式並貼近耳邊（無聲）時記錄腦電圖。4. 將手機處於講話模式並貼近耳邊（無聲）時記錄腦電圖。5.-7. 在關機後 3、5 及 10 分鐘記錄腦電圖。

Figure 1. Relative strength of the EEG rhythms in the frontal leads when under the influence of a mobile phone’s electromagnetic field during the stages of measurement.

圖 1. 在測量各階段，受行動電話電磁場影響時額葉導聯中腦電節律的相對強度。

Figure 2: Relative strength, %

圖 2：相對強度，%

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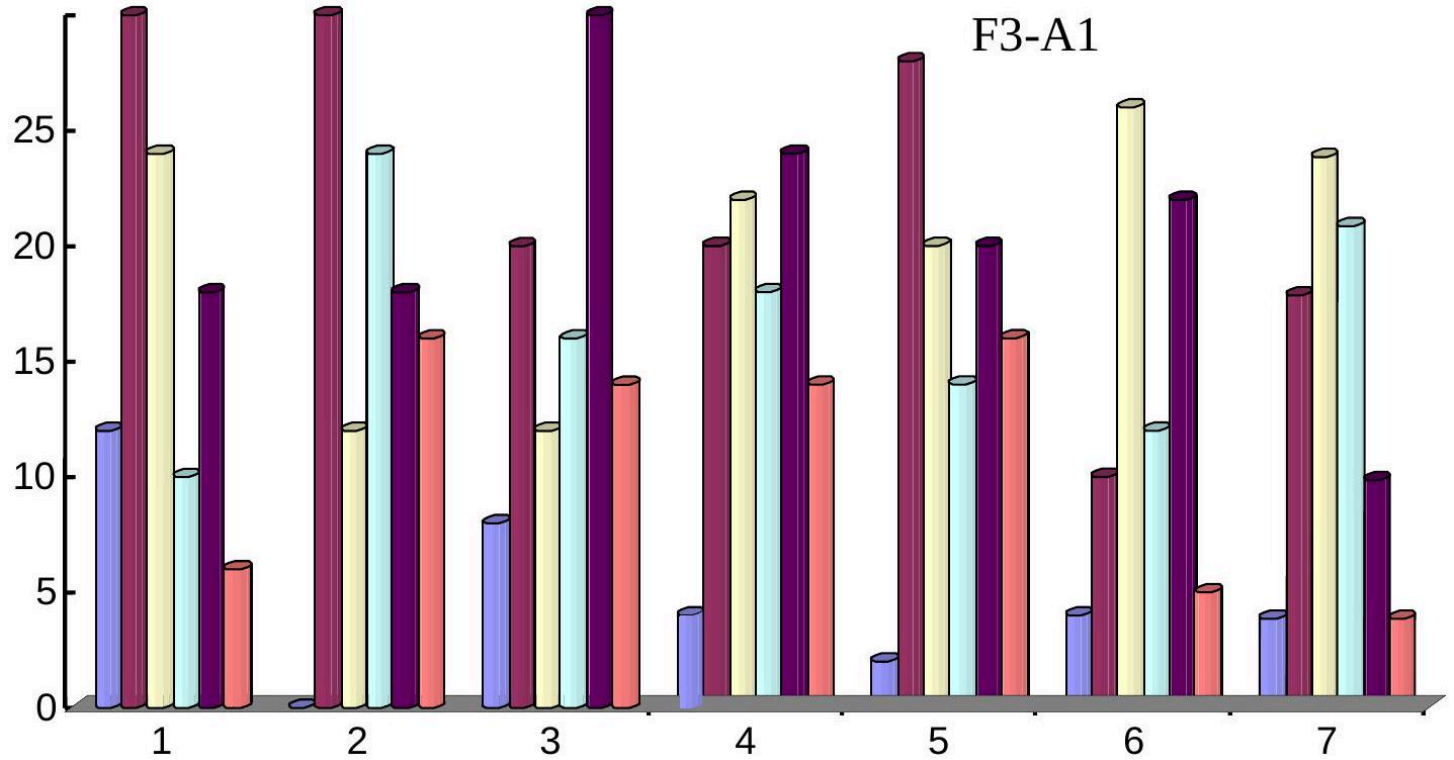
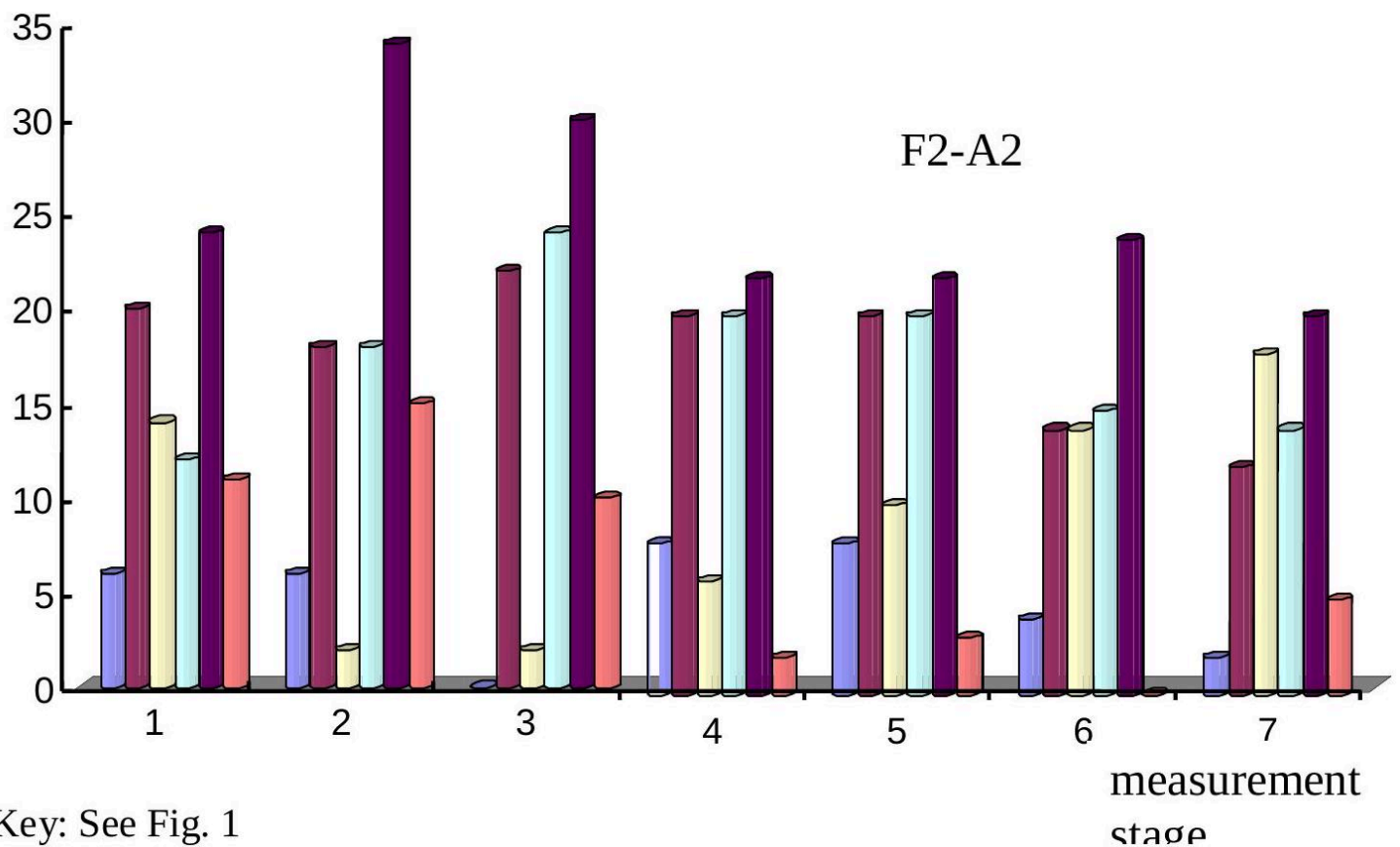


Figure 3: Relative strength, %

圖 3：相對強度，%

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Key: See Fig. 1

Figure 2. Relative strength of the EEG rhythms in the frontal leads when under the influence of a mobile phone's electromagnetic field while using electromagnetic radiation neutralizers during the stages of measurement.

圖 2. 在測量階段使用電磁輻射中和器時，於行動電話電磁場影響下前額導聯腦電節律的相對強度。

In the leads located on the side of the head opposite the mobile phone, no pattern was identified in the changes of the relative strength of the rhythms.

在位於與行動電話相對側的導聯中，節律相對強度的變化沒有識別出任何特定模式。

A comparison of the behavior of the relative strength of the rhythms of the brain's total bioelectric activity with and without an Aires Shield made it possible to detect statistically significant ($p < 0.5$) differences in its properties. Figure 3 shows the behavior of the relative strength of the delta and alpha rhythms of the EEG during all stages of measurement. It has been

比較在有無 Aires Shield 情況下大腦整體生物電活動節律相對強度的行為，可檢測到其性質上具有統計顯著差異 ($p < 0.5$)。圖 3 顯示了在所有測量階段中腦電圖 delta 與 alpha 節律相對強度的變化。已經

established that the elevation of the relative strength of these rhythms, which are manifest when using a mobile phone on the side exposed to the mobile phone, without using an Aires Shield, are virtually absent when it is used.

確定，當在暴露於行動電話一側使用行動電話且未使用 Aires Shield 時，這些節律的相對強度會上升；而在使用 Aires Shield 時，這種上升幾乎不存在。

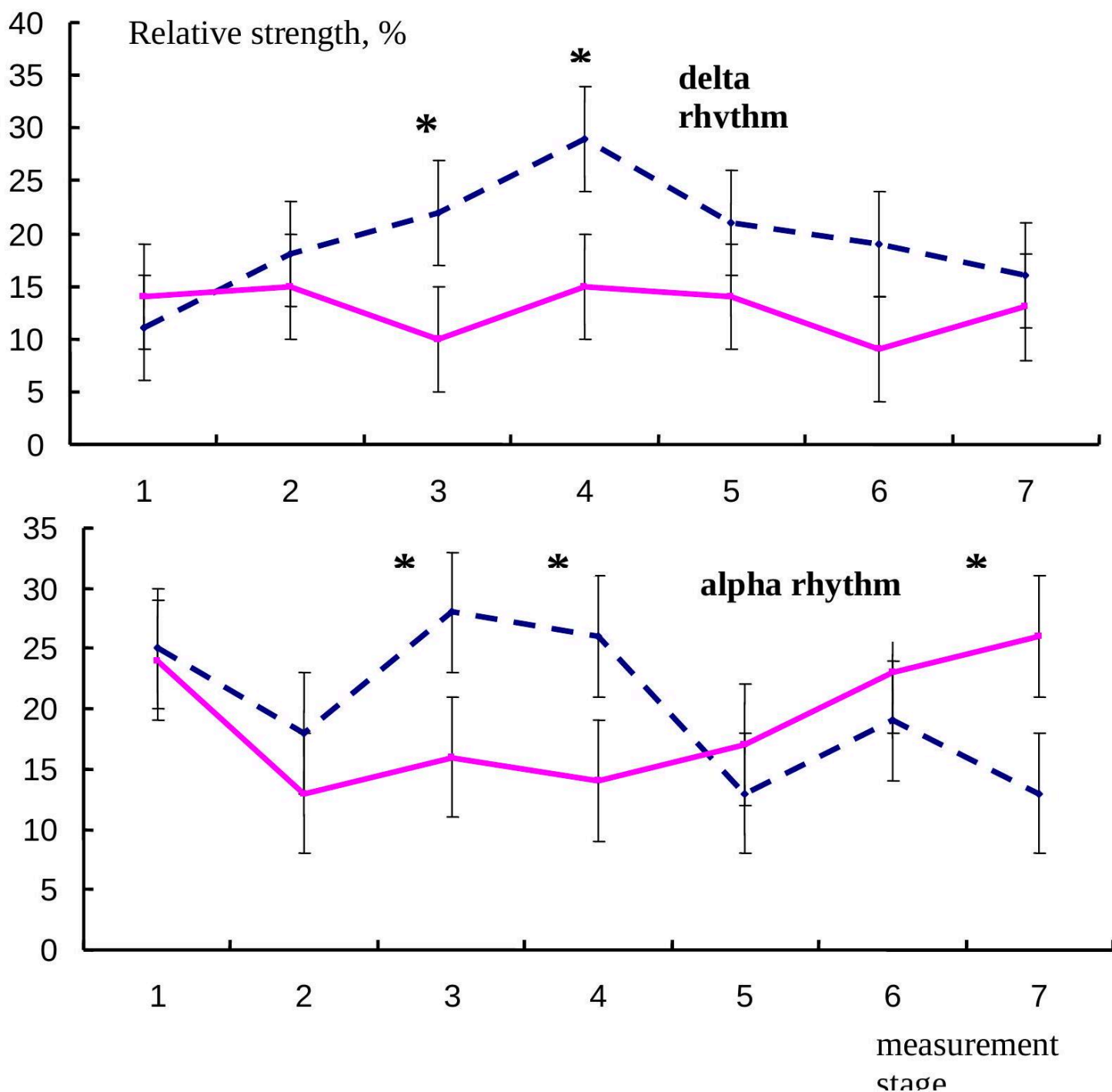


Figure 4: Key: 圖 4 : 說明 :
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— control measurements;
 — main series of measurements (using the Aires Shield).

Statistically significant change ($P < 0.05$).

統計上顯著的變化 ($p < 0.05$) 。

Figure 3. The comparative behavior of the relative strength of the EEG's rhythms under the influence of a mobile phone's electromagnetic field during the stages of the research in the main and control measurements (on the side of the head exposed to the field).

圖 3. 在研究各階段主測與控制測量中（位於暴露於場的一側頭部），行動電話電磁場影響下腦電圖各節律相對強度的比較行為。

Conclusion. Using an Aires Shield electromagnetic oscillation neutralizer when working with mobile phones operating on the GSM-900 standard inhibits electromagnetic radiation from interacting with the brain's own bioelectric activity on the frequencies of the alpha- and delta rhythms, which may be regarded as a protective effect.

結論。於使用符合 **GSM-900** 標準之行動電話時，採用 **Aires Shield** 電磁振盪中和器會抑制電磁輻射與大腦自有生物電活動在 **alpha** 與 **delta** 節律頻率上的相互作用，這可視為一種保護性效果。

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