Response Patterns of a Bio-sensor in Non-contact Healing: Analysis by Gas and Fluorescence Measurement Methods

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Abstract: The authors have studied quantitative measurements of non-contact healing power using pieces of cucumbers (Cucumis sativus ‘white spine type’) as a bio-sensor since 2006. In the present study, the authors discussed response patterns of the bio-sensor when using their gas and fluorescence measurement methods. Participants were 8 volunteer healers (1 male, 7 females; average age, 42.0y) and they did 2 trials of 30-min non-contact healing. The participants were given an instruction that they should change their healing ways in the 2nd trial. While the average gas J value (JG) was 0.061 and the average of the fluorescence J value (JF) was 0.051 in the 1st trial, JG became −0.096 and JF became −0.194 in the 2nd trial (p = 0.00037, p = 0.002). Through cluster analysis of response patterns of the bio-sensor with previous data, a set of discriminant functions was given which showed 83% of the patterns were correctly assigned.

Keywords: non-contact healing, cluster analysis, gas measurement method, fluorescence measurement method, cucumber, Cucumis sativus ‘white spine type’, discriminant function

1. Introduction

For the present study (Cucumber series No. 20), the authors studied relationships between response patterns of a bio-sensor and healing ways using their gas measurement method1,13 and their fluorescence measurement method4,16. The previous report16 of Cucumber series No. 20 showed only results of the gas measurement method. Analysis of relationships between healing ways and response patterns are now in progress. In the present paper, the authors discuss only the results of response patterns of the bio-sensor.

In the present paper, for simplicity, some anomalous therapies or phenomena, such as energy medicine, qigong therapy, laying-on-of-hands, spiritual healing, psychic surgery etc., are called non-contact healing or bio-PK.

2. Place and Date and Participants16

Experiments were done at the Institute of Living Body Measurements in the International Research Institute (IRI) from June 30th to August 5th, 2012. Participants were 8 volunteer healers (1 male K022; and 7 females S016, S017, M008, A011, S012, M009 and H006; average age of all healers was 42.0y) who are practitioners of non-contact healing recruited through a collaborator list, the Internet and social network services. They have experiences with Reiki, various spiritual healing methods, qigong and their own ways of healing. In the experiments, 5 healers (S017, M008, M009, H006, and K022) used their own healing ways, 5 healers (S017, A011, S012, M009, and H006) were participants in the previous study15, Cucumber series No. 18, which was done February 27th to March 30th, 2012. All healers were given explanations of the study and gave their written consent to participate before the experiments began.

3. Procedure16

4 paired dishes of experiment and control samples of cucumber (Cucumis sativus ‘white spine type’) were made as the bio-sensor in the same way as for the SCAT (simultaneous calibration technique)4,15. 2 pairs of dishes were used for the main test, and the other 2 pairs were used for the calibration test. Labels were put in all dishes, and dishes were covered by lids. The distance between experimental and control dishes of the main test was 12m during the healing trial (Fig. 1). Also, all dishes...
for the calibration test were kept at Place C during the healing trial.

One healing test (2 trials) was done by one healer a day from 1:00pm to 3:00pm. One trial was 30 min, and a healer did non-contact healing to let cucumber become more vivid and to increase cucumber odor. After about a 15-min rest, the healer did the 2nd trial, but she/he was given an instruction to change the healing ways. 3 healers (S016, S017, and M008) repeated the same way in the 2nd trial because they did not have plural ways of healing.

As a blank test, a pre-test was done about 1 hour before the healing test and a post-test was also done about 1 hour after the healing test. In the pre- and post-tests, experimental dishes were set on a table (at Place P in Fig. 1) for 30 min without healers, and other conditions were the same as the healing test.

After the trial, all lids were removed and each dish was set into a separate 2.2L plastic container. The containers were kept in a rack in Room A at room temperature (24°C) without sunlight. Also the rack was covered with a thick black cloth to avoid drafts.

![Fig. 1 P: Healing place. C: Making place of samples](image)

The next day, gas concentrations of each pair of experiment and control containers were measured with a short-term gas-measuring detector tube for ethyl acetate (141Ls, Gastec, Lot No. 20351 and 20653, 3 times at 100mL). And the authors calculated an index of bio-PK power (JG value: the natural logarithm of the ratio of gas concentrations of a pair of test and control containers). Data analyses were done using calibrated JG values which were obtained as an average J value of a calibration test subtracted from each measured J value in a SCAT set.

After gas measurements, dishes were taken from the plastic storage containers. Next, fluorescence of each pair of dishes was measured for 1 min using band pass filters. Fluorescence measurements were done using a highly sensitive camera with an image-intensifier (I.I.) (C2400-47, Hamamatsu Photonics; wavelength, 280-650 nm; sensitivity, 60mA/W at 400nm). Details of measurements were given in the previous study.15. The authors calculated true intensity [counts/10000 pixels] of each piece subtracting background noise. Next, they calculated JF value; the natural logarithm of the ratio of fluorescence intensities of a pair of experimental and control pieces. Moreover, in order to cancel any effect from the unevenness of lighting, the position of the sample dishes was changed and another measurement was made. The average of the fluorescence JF values was defined as the measured JF value. The same as for JG values, calibrated JF values were calculated and used in analyses.

4. Results

4.1 1st & 2nd trials and Pre- & Post-tests

Table 1 and Fig. 2 show results of all tests. Gas measurement results showed a similar pattern to 562nm fluorescence measurements, and 438nm fluorescence showed a similar pattern to 483nm fluorescence measurements.

For gas and 562nm fluorescence measurements, J values of the 2nd trial were significantly shifted to negative values (p = 0.00037, p = 0.002, Welch test, two tails), but, in the other bands, there was no significant difference between the 1st and 2nd trials. Also, there were significant differences between pre- and post tests for 438nm and 483nm fluorescence measurements (p = 0.014, p = 0.005, Welch test, two tails).

Comparison of healing and blank tests showed there were significant differences in average J values for gas and 562nm fluorescence measurements (p = 0.00036, p = 0.021, Welch test, two tails).

<table>
<thead>
<tr>
<th>Table 1 Summary of Results</th>
</tr>
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<tr>
<td></td>
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<tr>
<td>Pre J</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>SD</td>
</tr>
<tr>
<td>1st J</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>SD</td>
</tr>
<tr>
<td>2nd J</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>SD</td>
</tr>
<tr>
<td>Post J</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>SD</td>
</tr>
</tbody>
</table>

P value (Welch test, two tails)

| Between 1st and 2nd trials | 3.7 × 10^-4 | 0.428 | 0.841 | 0.359 | 0.002 |
| Between pre- and post-tests | 0.350 | 0.014 | 0.005 | 0.910 | 0.465 |
| Between healing and blank tests | 3.6 × 10^-4 | 0.432 | 0.375 | 0.915 | 0.021 |
4-2. Correlations

Significant correlations (p < 0.01) between J values were observed in 2nd healing trial only. Correlations of J values were r = 0.77 (p = 0.0002) between 438nm and 562nm measurements, r = 0.64 (p = 0.004) between 438nm and 483nm measurements, and r = 0.63 (p = 0.005) between 562nm and 438nm measurements. Fig. 3 shows data points of 438nm and 562nm fluorescence J values.

4-3. Cluster analysis and discriminant functions of response patterns

For analysis of response patterns of the bio-sensor, a combination of average $J_G$ and $J_F$ values was made for each trial. Additionally, all data of the previous study (Cucumber series No. 18) \cite{15} were also used for analyses. Then, totally 64 combinations were analyzed. Next, based on cluster analysis for healing data, the authors discussed discriminant functions which can describe all data of the healing and blank tests.

First, healing data were separated into 3 groups by cluster analysis using the Ward method with a standardized Euclidean distance (Excel-Toukei 2003, SSRI) (Fig. 4). Next, blank data were included in the 3rd group (Pattern III), and discriminant functions were calculated for all data (healing and blank data). Then, the authors obtained a set of discriminant functions which showed 83% of the patterns were correctly assigned. Table 2 and Fig. 5 show the discriminant function and distribution of discriminant scores.

Table 2 Discriminant Functions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Function 1</th>
<th>Function 2</th>
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<tbody>
<tr>
<td>Gas</td>
<td>-1.6294</td>
<td>3.3698</td>
</tr>
<tr>
<td>438nm</td>
<td>5.3711</td>
<td>-2.5083</td>
</tr>
<tr>
<td>483nm</td>
<td>0.5857</td>
<td>4.2349</td>
</tr>
<tr>
<td>535nm</td>
<td>1.2499</td>
<td>2.1812</td>
</tr>
<tr>
<td>562nm</td>
<td>2.5572</td>
<td>0.8670</td>
</tr>
<tr>
<td>constant</td>
<td>0.2355</td>
<td>-0.1808</td>
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</table>

Test of Discriminant Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Wilk’s Λ</th>
<th>Bartlett’s $\chi^2$</th>
<th>df</th>
<th>p value</th>
<th>significant</th>
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<tr>
<td>1</td>
<td>0.4145</td>
<td>51.9607</td>
<td>10</td>
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<tr>
<td>2</td>
<td>0.6734</td>
<td>23.3321</td>
<td>4</td>
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<table>
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<td>7</td>
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<tr>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>12</td>
</tr>
</tbody>
</table>

Correctly assigned 83%
5. Discussion

The instruction was given that the healer should try to increase gas of cucumbers and should change her/his healing way for the 2nd trial. The change of healing ways caused decreases in gas and 562nm fluorescence measurement values. This means that if healers are forced to change their healing way, a negative result will occur even if they never want it to occur. Moreover, it is considered that there are relationships between the generation mechanisms of matter in the gas and 562nm fluorescence measurements.

The authors confirmed the possibility that differences of healing ways were detected through analysis of response patterns of the bio-sensor (Fig. 4). Also, there were similar patterns among the wavelength bands in Fig. 2, and that suggests a future possibility that the wavelength band can represent some bands although it is too early to choose one band.

Usually, we expect that the result of the blank test is null ($J = 0$ in the present case). However, the pre- and post-tests (blank tests) did not show null in the present study. Similar results were obtained in the previous study (Cucumber series No. 18)\(^{15}\). This suggests that healing can affect other tests which are done before or after the healing test (Pre & post effect). Additionally, signs of $J_F$ of 438nm and 483nm fluorescence measurements were opposite in pre- and post-tests although signs of $J$ of gas and 562nm measurements were the same. This suggests that healing causes different effects for different wavelength bands. Further studies are needed.

It is considered that pattern analysis with gas and fluorescence methods is useful to discuss the details of healing mechanisms. In the future, the authors expect to find relationships between healing ways and response patterns of the bio-sensor through analyses of questionnaire surveys of healing ways.

6. Conclusions

It was reconfirmed that healers can change responses of a bio-sensor by changing their healing ways. Also, there were anomalous effects in the blank tests before and after the healing tests although the details of its mechanisms are still unknown.

Acknowledgements

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非接触ヒーリングにおける生体センサの反応パターン:
ガス測定法・蛍光測定法による分析
（Response Patterns of Bio-sensor in Non-contact Healing:
Analysis by Gas and Fluorescence Measurement Methods）

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要旨：筆者らは2006年以来、白いキュウリ切片を生体センサとする非接触ヒーリングパワーの定量的研究を行っている。本稿では、筆者らの開発した蛍光測定法とガス測定法を用いて、ヒーリングに対する生体センサの応答を検討した。被験者は公募したヒーラー8名(男1名、女7名、平均年齢42.0歳)で、各ヒーラーとも2試行ずつ30分間の非接触ヒーリングを行った。ただし、第1試行と第2試行でヒーリング方法を変えるよう指示した。結果、ガス J値と562nm蛍光J値は第1試行がJG=0.061、JF=0.051であったのに対し、第2試行はJG=−0.096、JF=−0.194となった(p=0.00037, p=0.002)。また、既報のデータと併せてセンサの反応パターンをクラスター分析した結果、判別的中率83%の判別関数が得られた。

キーワード：非接触ヒーリング、クラスター分析、ガス測定法、蛍光測定法、白いキュウリ、Cucumis sativus 'white spine type'、判別関数

1. はじめに

本実験シリーズ（キュウリシリーズ20）では、筆者らの開発したガス測定法1-13と蛍光測定法14-16を用いて、ヒーリング方法を変えた場合に生体センサの応答がどのように異なるかを調べた。初期分析としてガス測定法の結果を分析・報告したが16)、ヒーリング方法と反応パターンとの関係は分析中であり、本報ではガス測定と蛍光測定の結果を併せて生体センサの応答パターンの分析結果のみ報告する。

なお、生体エネルギー療法、外気療法、手かざし療法、スピリチュアルヒーリング、心霊治療など、既知の科学知識では説明困難な未知の要素をもつ現象（療法）を、ここでは簡単のため、非接触ヒーリングあるいは生体念力（bio-PK）と呼ぶ。

2. 場所・期間・実験協力者

実験は国際総合研究機構（IRI）生体計測研究所にて2012年6月30日から8月5日に実施した。

実験協力者は当研究所の実験協力者リスト、インターネット、ソーシャルネットワークによって公募した手かざしヒーリング経験者8名（男1名K022、女7名S016、S017、M008、A011、S012、M009、H006。平均年齢42.0歳）であった。ヒーリングの練習経験はレイキ、各種スピリチュアルヒーリング、気功、自己流で、実験時点で中心的に行っているヒーリングで最も多かったのは自己流5名（S017、M008、M009、H006、K022）であった。8名中の5名（S017、A011、S012、M009、H006）は2012年2月27日から3月30日のキュウリシリーズ18の参加者だった。各ヒーラーは実験前に研究内容の説明を受け同意書に署名した。

3. 実験手続き

生体センサ（白いキュウリの切片Cucumis sativus 'white spine type'）の作成は零点同時補正法（SCAT）に従い、実験・対照試料皿を4対作成した24,15）。そのうちの2対を主実験用、残り2対を較正実験用とし、無作為に識別ラベルを入れた後、ふたを
かふせた。施術実験中の実験試料と対照試料の距離は12mだった（Fig. 1）。また、施術中、較正実験用試料は全てFig. 1の位置に置いた。

ヒーリング実験は1日1名とし、午後1時から3時に行っ、1試行を30分とし、机の上のヒーリング実験試料（2皿）にキュウリが元気になるよう、よくかふせたよう非接触でヒーリングした。約15分の休憩の後、同様に第2試行を実施したが、第1試行とヒーリング方法を変えるよう指示した。なお、8名中の3名（S016, S017, M008）は複数のヒーリング方法を持っていなかったため、第2試行を同様に実施した。

プランク実験として、ヒーリング実験の約1時間前と後に事前・事後実験を1回ずつ行った。事前・事後実験ではヒーラーが施術を行う机の上のプラスチック容器に封入し、直射日光の当たらないよう厚手の布で覆いをかけた。

実験終了後、各試料はふたを取ってそれぞれ2.2Lのプラスチック容器に封入し、直射日光の当たらないA室の棚に室温24℃で保管した。なお、施術実験中の実験試料と対照試料の距離は全て12mだった。

4. 結果

4.1. 第1試行・第2試行、前後の違い

Table 1, Fig. 2に全体の結果を示す。センサの反応パターンは、ガスJ値と562nm蛍光J値、483nmと483nm蛍光J値が互いに類似したパターンを示した。ガスJ値と562nm蛍光J値において、第2試行のJ値は第1試行のJ値よりも負の方向に変位した（p = 0.00037, p = 0.002, Welch検定、両側）。なお、483nmと483nmとで事前・事後のJ値の間に有意な差が見られた（p = 0.014, p = 0.005, Welch検定、両側）。

ヒーリング実験、事前・事後実験の2群では、ガスJ値と562nm蛍光J値の平均値に有意な差が見られた（p = 0.00036, p = 0.021, Welch検定、両側）。

<table>
<thead>
<tr>
<th>Table 1 全体の結果</th>
<th>前</th>
<th>1st</th>
<th>2nd</th>
<th>後</th>
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<tbody>
<tr>
<td>J</td>
<td>0.131</td>
<td>0.030</td>
<td>0.052</td>
<td>-0.016</td>
</tr>
<tr>
<td>SD</td>
<td>0.127</td>
<td>0.201</td>
<td>0.392</td>
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<tr>
<td>438nm</td>
<td>0.061</td>
<td>-0.014</td>
<td>-0.028</td>
<td>-0.037</td>
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<tr>
<td>535nm</td>
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<tr>
<td>1st SD</td>
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<tr>
<td>J</td>
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<td>-0.207</td>
<td>-0.008</td>
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<tr>
<td>SD</td>
<td>0.138</td>
<td>0.151</td>
<td>0.579</td>
<td>0.334</td>
</tr>
</tbody>
</table>

Fig. 2 全データの平均

Fig. 1 Pはヒーリング場所、Cは実験作成場所
4-2. 相関の分析

J値の有意相関（p < 0.01）はヒーリングの第2試行においてのみ見られ、438nm–562nm間で r = 0.77 (p = 0.0002)、438nm–483nm間で r = 0.64 (p = 0.004)、562nm–483nm間で r = 0.63 (p = 0.005) であった。
Fig. 3に438nm、562nm蛍光J値の散布図を示す。

Fig. 3 ヒーリング第2試行の438nm、562nm蛍光J値

4-3. 反応パターンのクラスター分析と判別関数

反応パターンの分析は、まず事前・事後実験およびヒーリング実験の各試行ごとにガス・蛍光J値の平均を求め、その平均値の組み合わせを各試行のセンサーの反応パターンデータとした。さらに、既報15のきゅうりシリーズ18のデータも分析対象に加え、計64データとした。次に、ヒーリングデータの反応パターンをクラスター分析で大別し、これに事前・事後実験のデータを加えて全データを判別する適当な判別関数が得られるかどうかを検討した。

検討の結果、ヒーリングデータをクラスター分析（規格化されたユークリッド距離、ウォード法、エクセル統計2003）で3群に分け（Fig. 4）、第3群（パターンIII）に事前・事後実験のデータを加えたものを新たに第3群として判別を試みると、判別的中率83%の判別関数が得られた。Table 2とFig. 5に判別関数と判別得点の分布を示す。

Fig. 4 ヒーリングデータのパターンI, II, IIIと事前・事後データのパターン

5. 考察

本実験の実験指示はガスが増えるように、かつ第1試行と第2試行でやり方を変えるようにというものだった。結果として、第2試行はガスと562nmの蛍光物質を減らす方向にヒーリングが作用した。ヒ
ヒーラーが自然に行っているヒーリング方法を強制的に変更させると、意図した効果とは逆の効果が生じることがある。また、ガス生成機構と562nm帯の蛍光物質の生成機構との程度の対応関係があると考えられる。

Fig. 4に示す生体センサの反応パターンの違いから、ヒーリング方法の違いを捉える可能性の確認を試みた。現時点で測定波長帯を絞り込む必要がある。

結論
ヒーラーが意図的にヒーリング方法を変えることで、生体センサの反応の様相を変えられることが示唆される。生機序について、さらに詳しく検討する必要がある。