SPATIAL DISTRIBUTION OF HEALING POWER
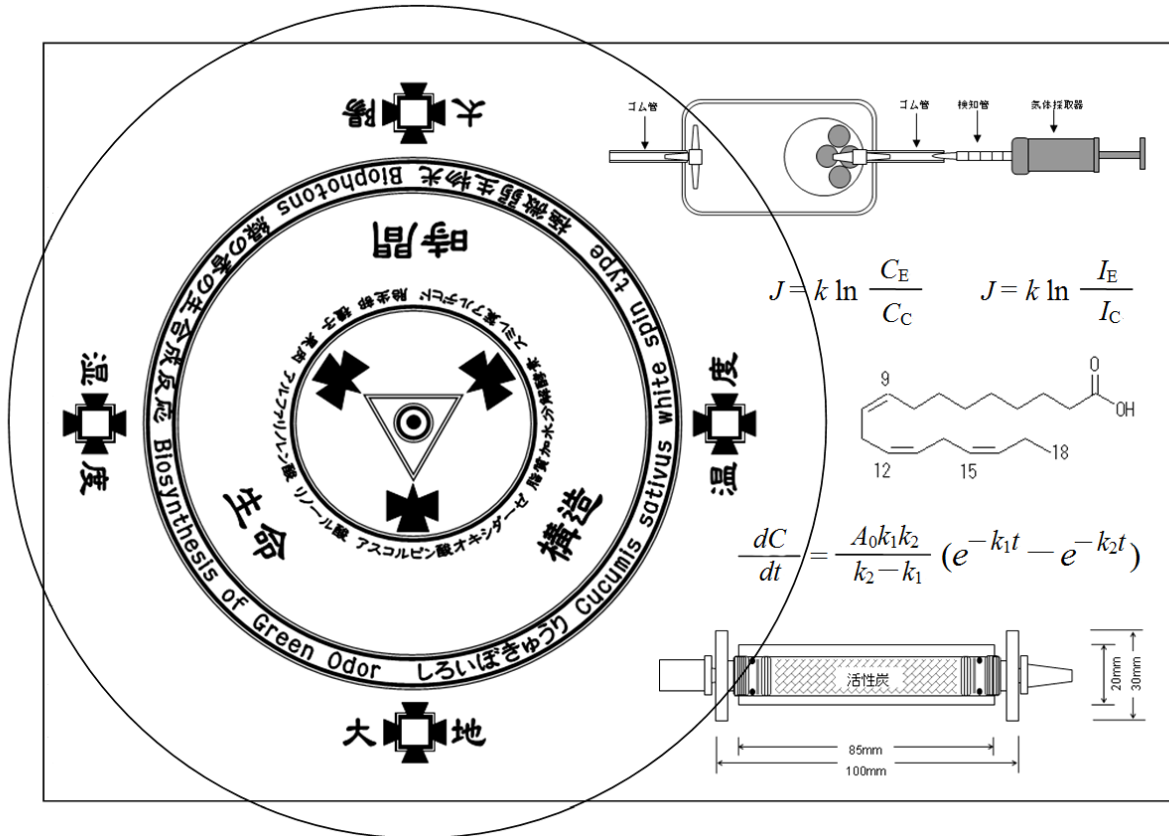## -BIOPHYSICAL APPROACH TO BIO-PK AROUND A HUMAN BODY-

Hideyuki Kokubo[1,2], Osamu Takagi[1] & Yasuyuki Nemoto[1]

[1] *Institute for Living Body Measurements, International Research Institute*
Chiba, Japan
[2] *Institute for Informatics of Consciousness, Meiji University*
Tokyo, Japan

We have developed 2 new methods of quantitative measurements for bio-PK in which pieces of cucumber fruits (*Cucumis sativus* 'white spine type') were used as bio-sensors. One of them is the biophoton measurement method, and the other is the gas measurement method. We executed precision measurements of spatial distribution of controlled healing power around healers (within 2.5m) using our gas measurement method. In this paper, we show a summary of recent our studies; A wave-like potential distribution is generated around a healer's body during bio-PK tasks; Psychic healers showed symmetric pattern and we could discuss approximated equations of bio-PK field. Volunteer-healers showed different patterns and their patterns were considered to be related to their healing ways.

INTRODUCTION

In the present paper, we use terms "non-contact healing" or "bio-PK" for bio-energy therapy (magnetic therapy), laying-on-of-hands, qigong therapy, spiritual healing, and psychic healing. Our studies are biophysical approaches for non-contact healing. Since 2006, we and collaborators have studied quantitative measurements of healing "power" using our biophoton measurement method in which pieces of fruit of cucumber (*Cucumis sativus* 'white spine type') are used as bio-sensors[1-16,18]. Moreover, we have succeeded to develop a gas measurement method using amount of cucumber gas (odor)[17-21], and carried precision measurements of spatial distribution of "potential"[22-24] around a human body. In the present paper, we show a summary of our recent studies of potential distribution of bio-PK. Here, both the terms "power" and "potential" are used only for convenience, the examination of the physical validities of these terms is a future subject.

BIOPHOTONS AND GASES OF CUCUMBER

Cucumis sativus 'white spine type' is the most popular cucumber in Japan. In our biophoton measurement method, a healer tries to increase the intensity of biophotons emitted from cucumber pieces without direct touches for 30 min. After healing, we measure biophotons of cucumber pieces for 18 h. **Fig. 1** shows an example of our experiments. Intensities of biophotons from experimental pieces are larger than controls. There is no difference of biophoton intensities between experiments and controls at the first 4 h. Bio-PK reaction starts after 5 h (this bio-PK reaction can be approximated by a chain reaction)[17]. Moreover, this bio-PK reaction is detected in visual light (wave length: <650nm), but we have not succeeded to detect it in near infrared ray (wave length: <1000nm)[14].
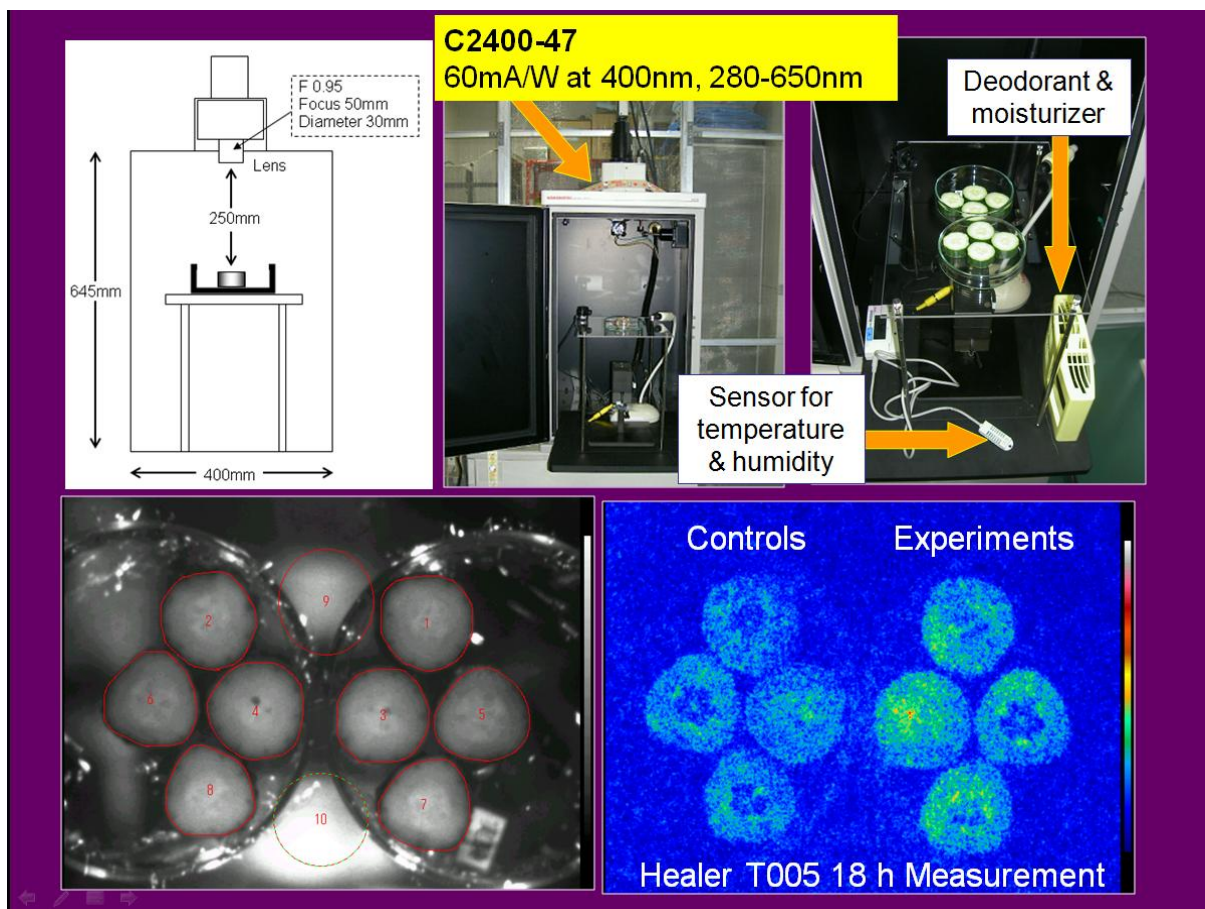

Fig. 1 Biophoton Measurement Method
Intensities of experimental samples are larger than controls (Bottom-Right).

Cucumber gases (odor) are generated when cucumber are cut and contacted the oxygen in the air. It is biosynthesis of green odor [25]. A part of biophotons is generated on process of biosynthesis of green odor, and amount of gases relates to the intensity of biophotons. Therefore, we can measure effects of healing through measurements of amount of gases, not only biophotons.

Biosynthesis of green odor starts automatically when oxygen in the air contacts the cutting surface of a cucumber piece (**Fig. 2**). The major component of cucumber gases is violet leaf aldehyde (52.6%). Green odor is a kind of disinfectant. Biosynthesis of green odor is a kind of self-defense mechanisms against illness and insects. All green plants have this mechanism. Therefore all green plants are useful as bio-sensors theoretically (this is the reason that carrot is not useful in our methods). Cucumber is a good plants because of practical reasons; shape and easiness of obtaining.

Moreover, in our methods, we use slice (injured) pieces of cucumber and healers try to act on cucumber's self-defense. In this meaning, our methods are designed as a model of clinical situations of healing practice.
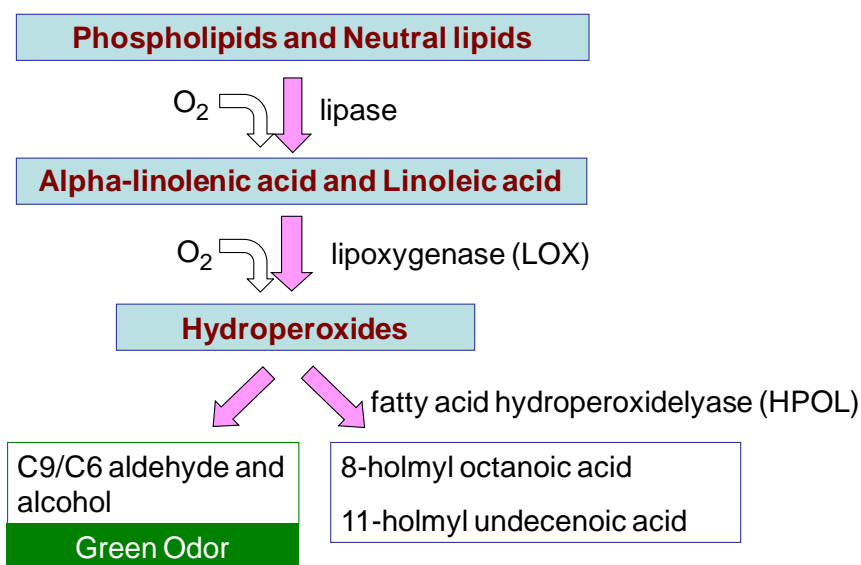
Phospholipids and Neutral lipids

O_2 — lipase

Alpha-linolenic acid and Linoleic acid

O_2 — lipoxygenase (LOX)

Hydroperoxides

fatty acid hydroperoxidelyase (HPOL)

C9/C6 aldehyde and alcohol

Green Odor

8-holmyl octanoic acid

11-holmyl undecenoic acid

Fig. 2 Scheme of Biosynthesis of Green Odor

METHODS

Principle of Gas Measurement Method

Principle of our gas measurement method are shown below[17,20]. One hour before the experiment, the surface of a cucumber is disinfected with ethanol. A circular slice (thickness: 2cm) is cut for the cucumber. Next, the slice is cut again and opened into 2 slices (thickness: 1cm). One of the paired pieces (vine side) is used as the experimental sample and the other (flower side) is the control. The pieces are set into 2 Petri dishes symmetrically. This operation is repeated until 4 paired pieces are set into the dishes. Both dishes are covered with lids. A healer executes non-contact healing for 30 minutes against the experimental dish attempting the increase of odor of cucumber. The control dish is kept at another place during the healing task. After healing, lids are removed from dishes, and dishes are set into 2.2L sealed plastic containers (**Fig. 3**). The containers are kept in a room at 24 degree of Celsius. Biosynthesis of green odor occurs at the surface of cucumber pieces using oxygen in the air, and volatile components (cucumber gas) are accumulated in the container. Gas concentration reaches at the maximum about 12 hours after, and becomes stable[18]. 24 hours after setting, gas sample (100mL) is taken 3 times from each container using a short-term gas-measuring detector tube for ethyl acetate (141L, Gastec, Japan) and a sampling pump (GV-100, Gastec, Japan). At that time, an activated carbon filter is attached to the inlet of each container, and a pair of gas-measuring detector tubes are used which are chosen from the same lot[19,20].

J value, the natural logarithm of the ratio of gas concentrations of experiment C_E and control C_C, is used as an index of healing power.

$$J = k \ln(C_E / C_C)$$

Here, k is a coefficient and $k = 1$.

Left term of this equation is the magnitude of healing power (effect), and right term consists of physical values only. It suggests that we can deal with bio-PK phenomenon as a kind of physical phenomena through this equation.
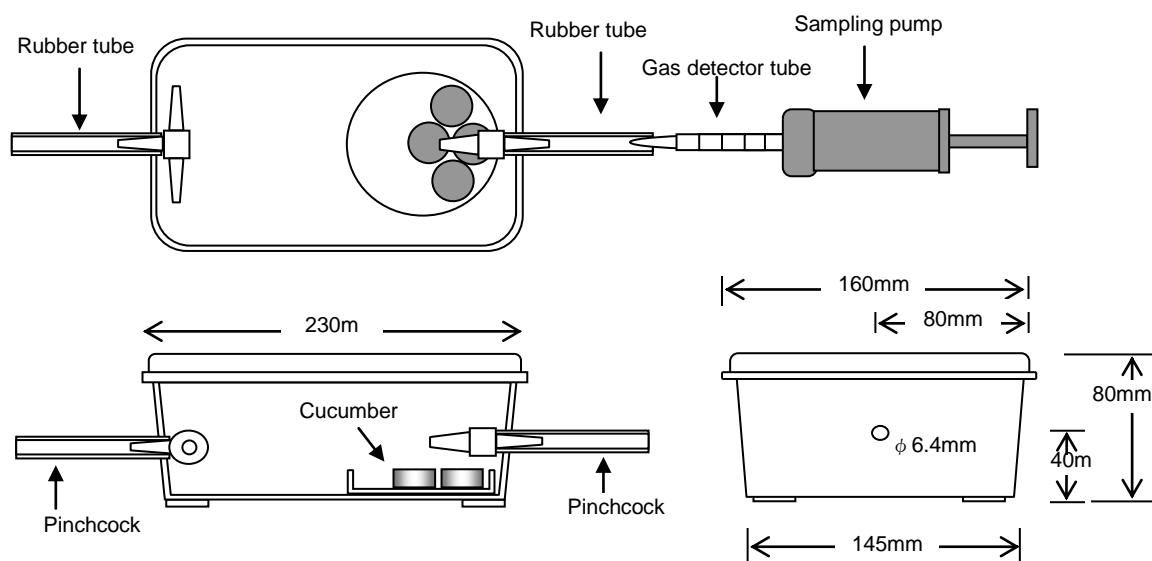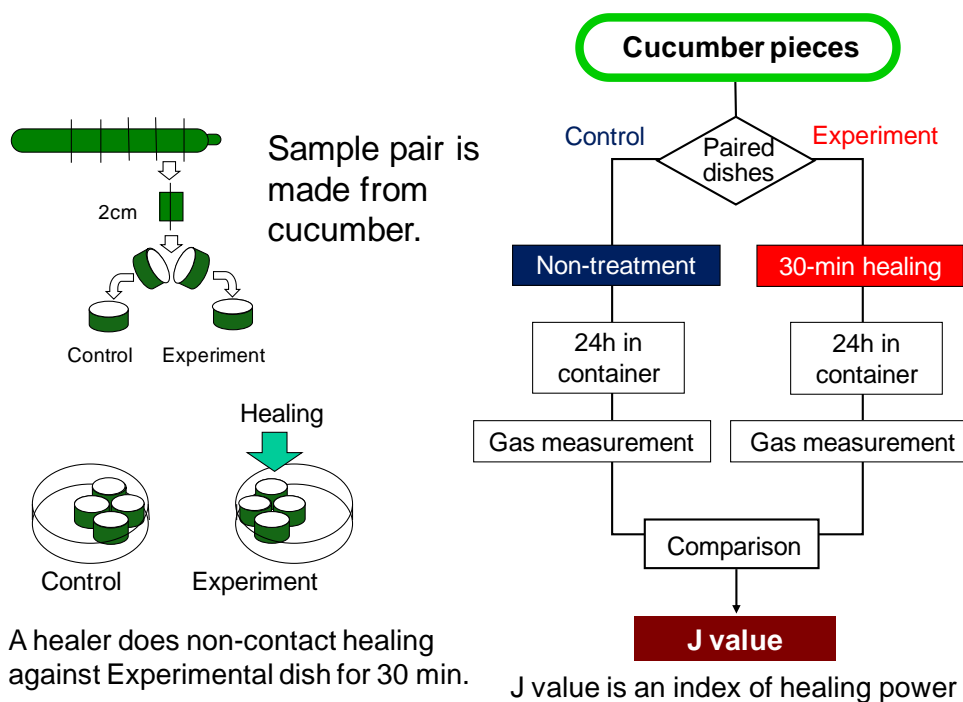
Fig. 3   Gas Sampling Set

Fig. 4 Basic Way of Gas Measurement Method
Our gas method can be characterized as concept of "bio-sensor", use of sample pairs of experiment and control, use of J value, post measurement, long-term measurement, and simultaneous multiple-place measurement.

In an actual healing test, 4 paired dishes are made from 4 cucumbers, and two pairs of dishes of them are used for a healing test and the others are used for a calibration test to calibrate the J value (SCAT: simultaneous calibration technique, **Fig. 5**)[19,20]. By deducting the average of J values of the calibration test from the average of J values of the healing test, the true value (J_0) of the trial can be obtained. In our usual experiments, we use the average value of 2 trials as healer's power.
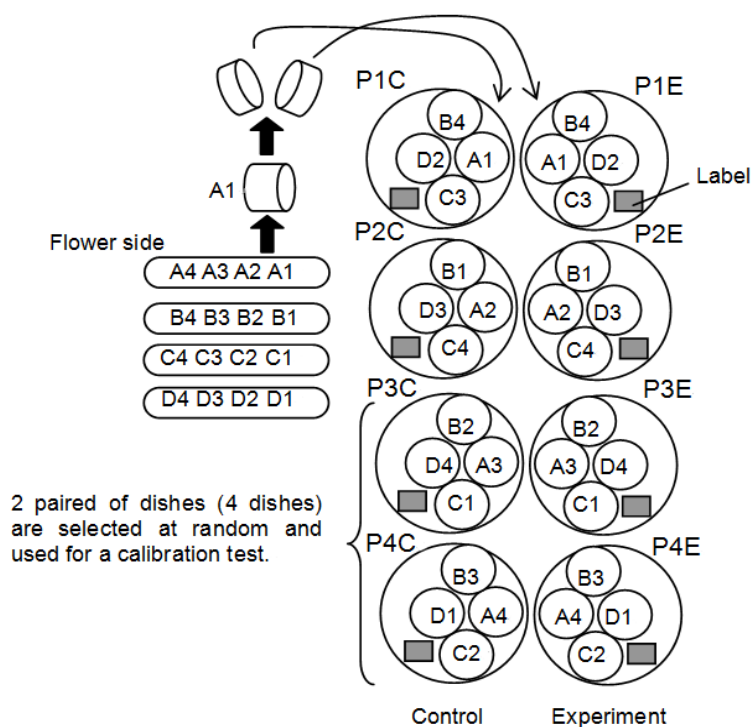

Fig. 5   Making Sample Dishes by SCAT

Four cucumbers are used for SCAT. For the 1st cucumber, the experimenter cut a round slice (A1) (thickness: 2cm) and cut again it at the middle, then he opens it and sets the pieces symmetrically in Petri dishes P1E and P1C. Next, he cut a round slime (A2) and cut it again at the middle, then he sets the pieces symmetrically in Petri dishes P2E and P2C. As the same way, he makes pieces from A3 and A4 and sets them in P3E, P3C, P4E and P4C.

In the present study, healing measurements were done using the simultaneous calibration technique (SCAT)[18-22].

Cucumber sample dishes for potential measurements were made in the same way as for SCAT[21,22]. The spatial resolution was 50cm for psychic healers W003 and W004. Dishes for the potential measurement for W003 were set at 4 points at 50 cm intervals in forward, backward, rightward and leftward directions from her; and 4 points at 45-degree angles between the four directions (about 2.5 m distant from her; designated as oblique) (**Fig. 6**). In the test for W004, dishes were set in forward, backward, rightward and left directions from her and 4 points above her head (**Fig. 7**). In the tests for volunteer-healers, their potential distributions were measured at 8 points at 25 cm intervals in forward, backward, rightward and leftward directions from them (**Fig. 8**).

Control sample dishes and calibration test dishes (for SCAT) were kept in another room, 12 m from the healers during the healing trials (**Fig. 9**).

All participants did 2 trials an experimental day. At the 2nd trial, they were given an additional instruction that they should take effort to do healing in the same way of the 1st trial. All process of healing tests was recorded by a video recording system.
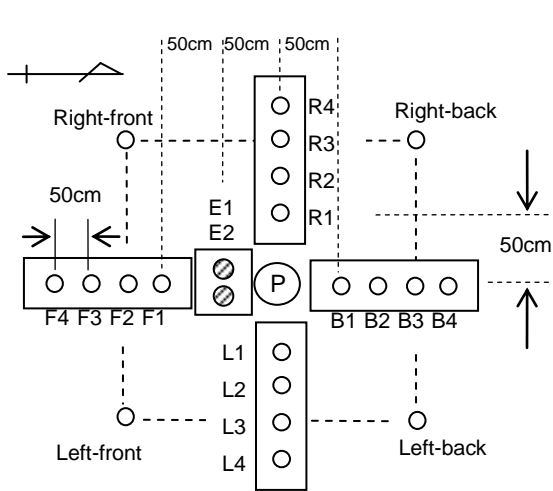
Fig. 6 Arrangement of Samples for W003
June 21, 2010
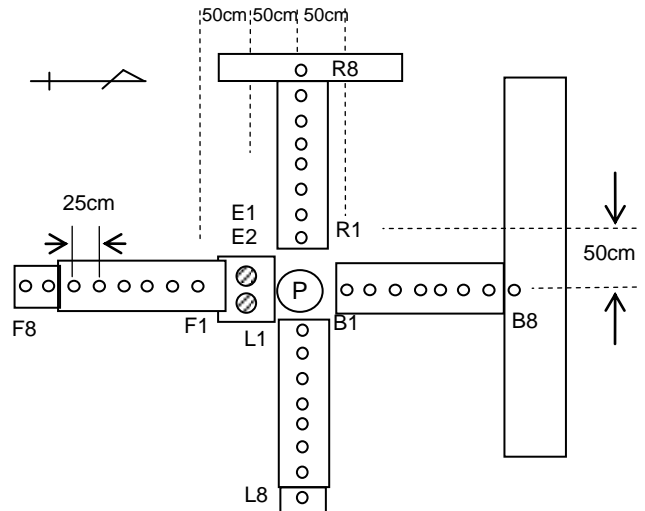E1 and E2 were used for healing test.

Fig. 8 Arrangement of Samples (Volunteer-Healers)
Spatial resolution: 25 cm.
E1 and E2 were used for healing test.
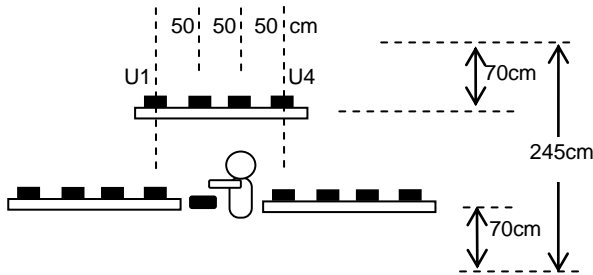

Fig. 7 Changes for Test with W004
August 11, 2010. Four oblique points for W003 were replaced with 4 points above her head.
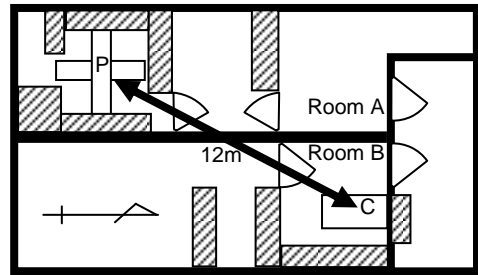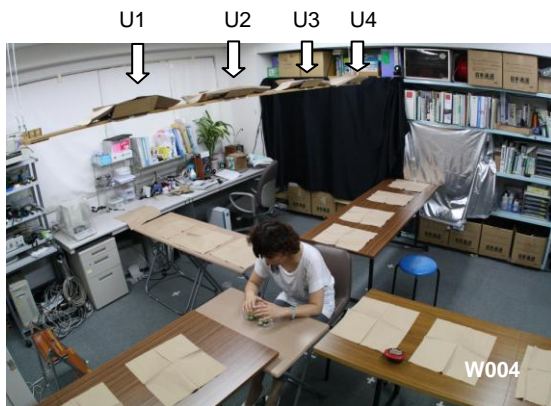

Fig. 9 Participant (P) and Control (C)

Fig. 10 Trial
Healers did non-contact healing against E1 and E2 on a table. Dishes for potential measurements were covered by paper towels in order to avoid disturbance of healer's attention.

Participants, Place and Date

All experiments were done at the International Research Institute (Chiba, Japan). Before experiments, all participants were given an explanation of the study and they signed an agreement document.

Psychic healers were W003 (female, 41 years old) and W004 (female, 43 years old). They are famous Chinese psychic sisters in Japan and China, and many researchers have tested them since 1978. They were tested June and August in 2010 in our laboratory.

Five volunteer healers (3 males, 2 females) were recruited through a list of participants and the internet search, and their average age was 53.2 y. Two (K007 and S012) of them had been tested by the biophoton measurement method previously; K007 had J = 0.171 (n = 8) in 2006[4]; S012 had J = 0.145 (n = 8) in 2008[15]. They were tested from September to October in 2010.

Instructions

The following instructions were given verbally to the healer.
Start of trials. "These cucumber pieces have been recently made. There is more odor for fresh and vivid cucumber pieces. Please do non-contact healing to try to increase the vitality of the cucumber pieces and their odor. Please concentrate on the experimental pieces just in front of you. Do not pay attention to others. Fifteen minutes after the start, a sign will be given to you. However, please make an effort to do non-contact healing for a full 30 minutes."
After 15 min. "Fifteen minutes have passed. Please continue to do non-contact healing to try to increase the vitality of the cucumber pieces and to increase their odor."
Additional instruction at 2nd trial. "Please repeat healing in the same way as 1st trial."

RESULTS & DISCUSSIONS

Results of Healing Tests

Tables 1 and 2 show results of healing tests. Psychic healers showed significant J value (average J = 0.111, p = 0.017, two tails, t-test) and volunteers showed significant J value (average J = 0.124, p = 0.003, one tail, t-test).

Table 1 Healing Tests by Psychic Healers

Healer ID, Gender, age, Trial date	Calibrated J value		Average J		Lot No.
	Healing test	Calibration test			
W003 * f, 41y June 21, 2010	0.161 0.102	0.029 -0.029	1st trial 0.131	0.119	00437
	0.033 0.181	0.006 -0.006	2nd trial 0.107		
W004 f, 43y August 11, 2010	0.184 0.235	-0.020 0.020	1st trial 0.210	0.103	00538
	-0.125 0.118	0.033 -0.033	2nd trial -0.004		
Average	0.111	0.000			
SD	0.114	0.026			
95% confidence interval	0.095	0.022			
p value (two tails)	0.017				

* Data of W003 were calibrated at signature because she missed to control direction of her power.

Table 2 Healing Tests by Volunteer-Healers

Healer ID, Gender, age, Trial date	Experience year, clients	Main technique in usual way	Outliers (>0.5) were omitted			
			Calibrated J		Average J	
			Healing	Calibration		
O004 f, 36y Sep 25, 2010	<3y <100 clients	Flower of Life Healing (FOL)	0.278	-0.116	1st trial	0.281	0.191
			0.284	0.116		
			0.355	0.068	2nd trial	0.102	
			-0.151	-0.068		
K020 m, 63y Oct 2, 2010	>10y >100 clients	Laying-on-of -hands	0.006	0.169	1st trial	0.097	0.145
			0.188	-0.169		
			0.066	0.055	2nd trial	0.193	
			0.321	-0.055		
K007 m, 70y Oct 18, 2010	>10y >100 clients	Remote Qigong	0.096	0.142	1st trial	0.096	0.130
			—	-0.142		
			0.188	0.133	2nd trial	0.148	
			0.108	-0.133		
S012 f, 45y Oct 23, 2010	3-6 y <100 clients	Craniosacral biodynamics	0.049	0.019	1st trial	0.120	0.175
			0.190	-0.019		
			0.214	-0.142	2nd trial	0.231	
			0.248	0.142		
S015 m, 52y Oct 30, 2010	>10y >100 clients	Qigong	0.158	0.087	1st trial	0.001	-0.019
			-0.156	-0.087		
			-0.021	0.000	2nd trial	-0.039	
			-0.058	—		
Average			0.124	0.000		
SD			0.151	0.113	141L Lot No. 00639	
95% confidence interval			0.073	0.055		
p value (one tail)			0.003			

Potential Measurements of Psychic Healers

Fig. 11 shows estimated average potential distributions of psychic healers. Healers were located at the center of each figure. Each graph is drawn using linear interpolation of points which distances from the origin are the same. Green color is J = 0 (there is no difference between experiment and control). Red means positive area and blue means negative area. The distribution is symmetric obviously in left-right direction and this pattern is considered as basic pattern of healing potential.
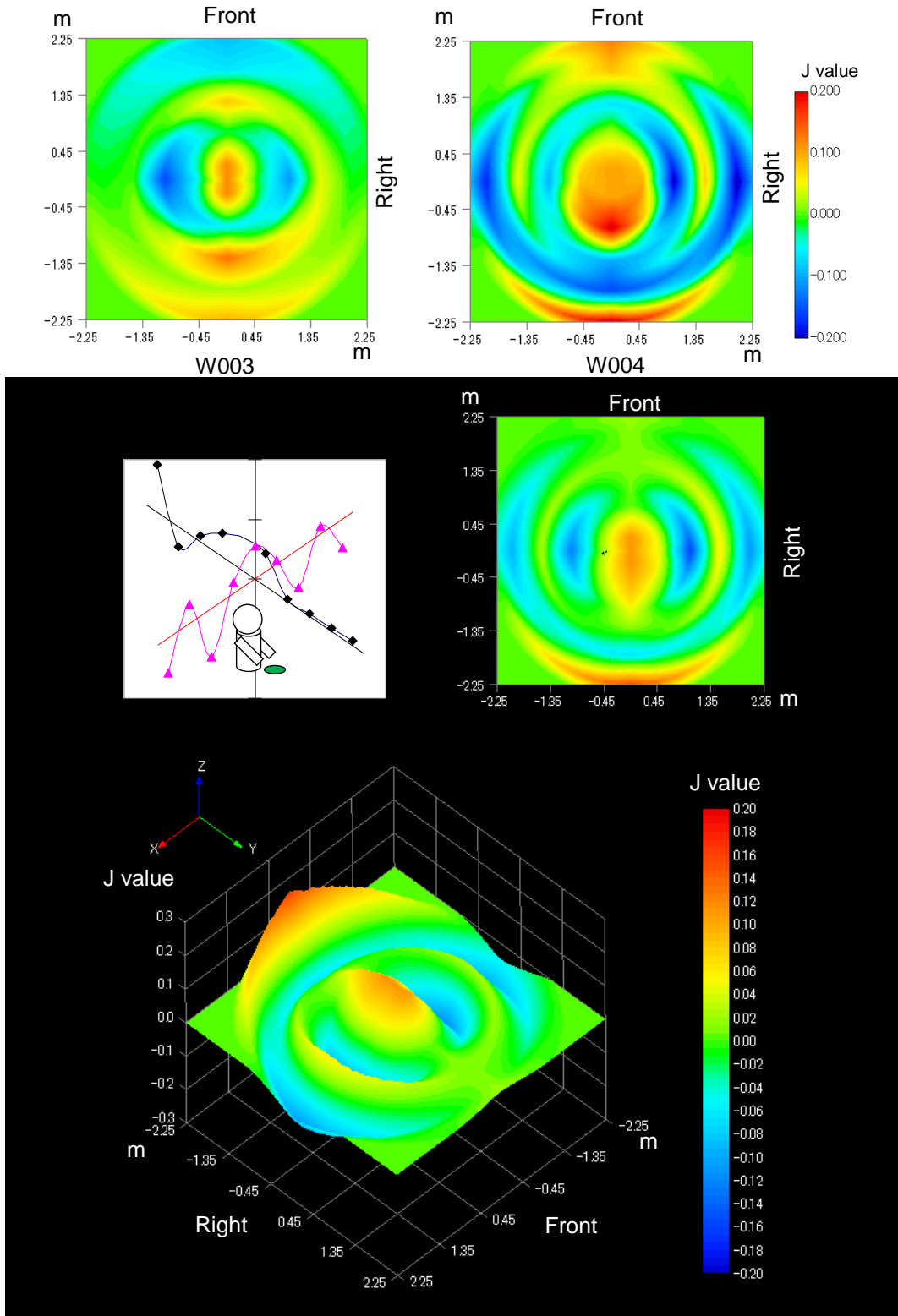

Fig. 11 Estimated Spatial Potential Distribution of Psychic Healers
Original spatial resolution: 50 cm. Upper: Individual patterns of psychics (average of 2 data).
Middle and Bottom: Average distribution (4 data, 2 psychics)

Wave-like Potential and Layer-structure

There are many studies on healing, and some have reported that, for example, healing effects can be detected near a healer's body not only at the target, moreover healing effects seem to reach to distant places (10^4 km)[23]. However, we cannot compare our present study with other experimental studies because none like the present study which was focused on precise measurements of spatial distribution of healing power around the human body (< 3 m). Therefore we discuss the relationship between our experimental results and empirical claims by spiritualists or mystics.

The wave-like potential distribution means that an invisible layer-structure is generated around the human body (**Fig. 12**). Some persons often claim that our bodies are surrounded by a "layer-structure" of so-called bio-energy field, for example, some mystics often claim that we have invisible bodies out of our physical bodies such as Etheric, Astral, Mental or Causal bodies. Also, another person, such as qigong and Reiki masters, often claims "I can feel a border surface of different qi/ki energy around a human body".
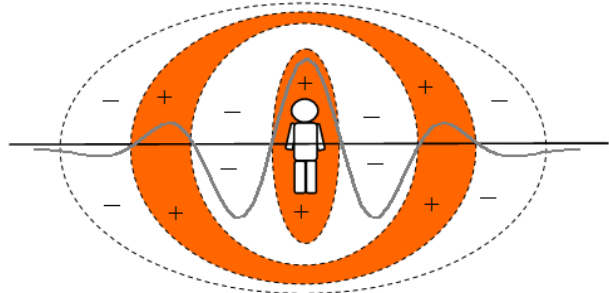

Fig. 12 Wave-like Potential Means Layer-structure

The purpose of the present study was not to examine their empirical claims. However, our results partially support their claims. Their empirical claims are considered as alternative expressions of the wave-like potential. In other words, the wave-like potential distribution is well-known as a "layer-structure" empirically.

Reverse Areas of Potential Distribution

There are reverse areas of potential distribution in **Fig 11**. The odor of cucumber is decreased at reverse areas even if the healer tries to increase the odor of target cucumbers.

Some qigong masters often claim that there are different qi(s) and different qi(s) will cause different results. If we use the concept "reverse area of potential", we can say that healing effects will be changed according to the places. There is a possibility that a part of empirical claims can be explained with the concept "reverse area of potential". In addition, some types of psi-missing may be caused by miss-control of "potential distribution", not only mental reasons. Reverse area of potential suggests that we should re-discuss the spatial arrangements of experiments; for example, distance and direction between the healer and the target.

The reverse potential area may be needed to explain the smallness of effect size in global psi phenomena. As you know, Dr. Roger Nelson (Princeton University, USA) has executed the Global Consciousness Project (GCP) which is a project to measure unconscious psi effects in global scale (the range; < 18000 km) using a field RNG network. Detected effects are considered as accumulations of many people's psi. However, the effect size of psi is small generally in GCP although numbers of people are huge. Here, imagine what happens if our potential distributions interact with other persons near us. We have not tested such conditions yet, but we can forecast a possibility that people together and their "fields" interact with each other, then almost all psi effects are cancelled by reverse potential areas, and finally, the total effects become small. We should discuss additivity of PK with an assumption that the reverse potential area is a universal accompanying phenomenon.

Thus, the reverse potential area suggests many possibilities although the range of our measurements is limited within several meters.

Approximated Equation

One of merits of potential measurements is that we can discuss approximated equations of potential distribution of healing power. As a sample, here, $U(x, J_0)$ is a function of potential distribution, $f(x, J_0)$ is a function which has periodic and damping components of distance x, J_0 is the average healing power of the healing test, and U_B is background potential.

$$U(x, J_0) = f(x, J_0) + U_B \qquad \text{(Eq. 1)}$$

U_B is assumed to have effects similar to healing effects and it exists in our universe and drifts slowly[18]. At least in the present discussion, we need to adjust it to zero.

In the right-left direction data of psychic healers, we can approximate them if cosine and Gaussian functions are used as $f(x, J_0)$.

$$U(x, J_0) = J_0\, a \cos(\beta x) \exp(-cx^2) + U_B \qquad \text{(Eq. 2)}$$

Equation 2 is a simple approximation of the wave-like potential distribution. We should improve it more. For example, Eq. 2 is not good for **Fig. 13** (see next section). Now, we have discussed another equation with Hermit polynomial. And also, we have discussed below differential equation as a source of the equations using a quantum harmonic oscillator model (it is unknown yet what vibrates)[24].

$$\frac{d^2 J}{dz^2} + (\lambda - z^2)\, J = 0 \qquad \text{(Eq. 3)}$$

Here, z is a dimensionless coordinate and λ is a parameter which represents a state of the system. Equation 3 is one of candidates of the fundamental equation of healing phenomenon, and it suggests a possibility that we should measure 2 unknown factors (λ term and z^2 term), not only psychic factor (J value).

Precision measurements of potential distribution have been just started, and above our discussion is on going. We will improve our discussions on equations of bio-PK if we succeed to develop new real-time sensors.

Potential Measurements of Volunteer Healers

Fig. 13 shows estimated potential distributions of average of upper 5 data and lower 5 data of healing power of 5 volunteer healers. It is considered that the former suggests the healers succeeded to concentrate their power on the target, and the later suggests the healers did not succeed to concentrate their power (their power were spread). There was a tendency apparently that laying-on-of-hands or image formulating type healers (O007, K020, S012) showed the former pattern and qigong type healers (K007, S015) showed the later pattern (**Fig. 14**).
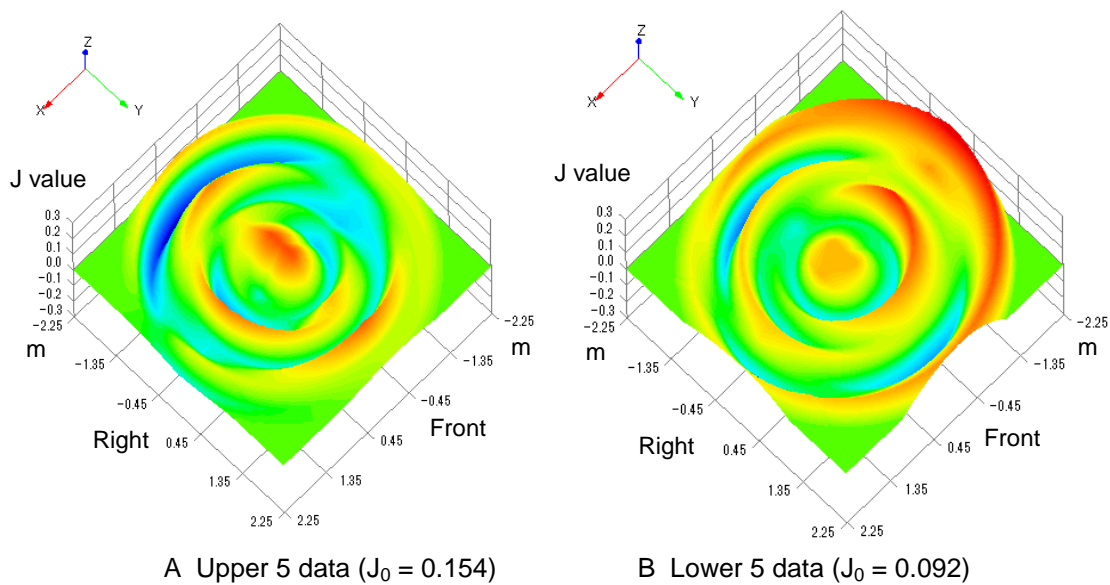

A Upper 5 data ($J_0 = 0.154$)   B Lower 5 data ($J_0 = 0.092$)
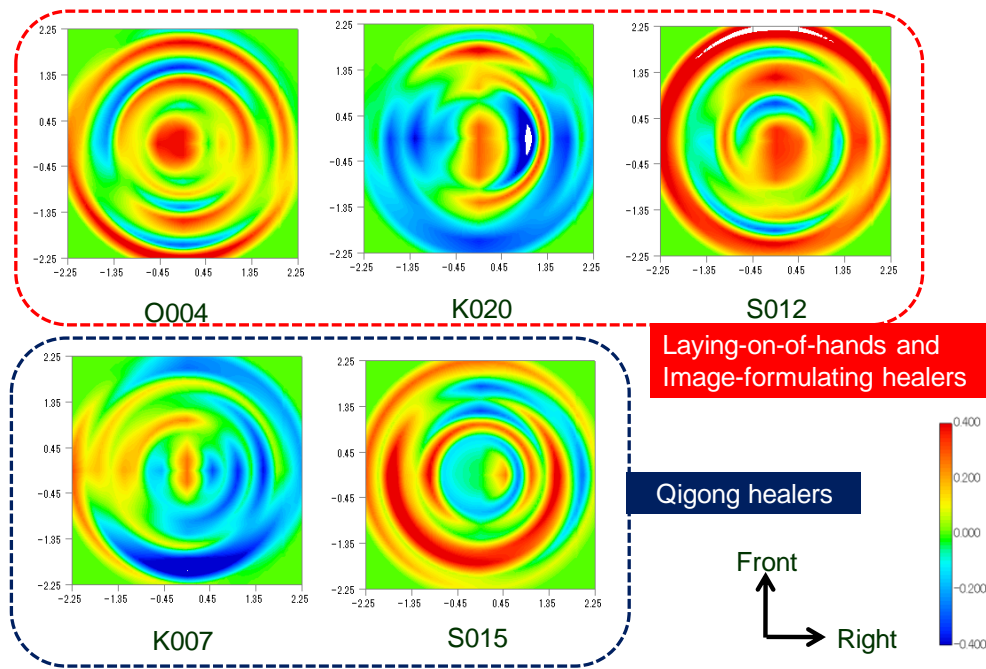
Fig. 13 Volunteer Healers

Fig. 14 Individual Patterns of Volunteer Healers
Laying-on-of-hands and Image-formulating type healers showed concentration pattern while qigong type healers showed extension pattern.

Distribution Pattern and Healing Way

The pattern of potential distribution is considered as depended on healing ways. Laying-on-of-hands type healers could concentrate their power on the target of healing possibly because they are familiar with close therapy. While power of qigong type healers was considered to be extended because they are familiar with distant therapy (the distance is a few meter usually). There is a possibility that we can categorize healing ways by their averaged patterns of potential distribution in future. Moreover, we may be able to estimate healer's degree of skills of controlling power through stability of his pattern.

Spiral Pattern

Fig. 15 shows the average of whole data of 5 volunteer healers (10 data). There is a spiral around the center. The reason of the spiral is unknown at present day. There are some possibilities, for example; 1) artifact of calculation, 2) interaction with electric devices which were acting at healing tests, 3) the healers controlled their power like a spiral (a way of healing); some healers often claim that they collect "energy" like a spiral flow from space around them.

The 3rd possibility is interesting if we discuss relationship between "energy" and "information". For example, Hasted[26] reported that; psychics (metal benders) tried to give their power to strain gauges (arranged at about 10 cm intervals) from about several meters away, and then synchronized signals were observed from strain gauges. His results support that we can generate and control a focus point of psi power out of our bodies. Moreover, the focus point seems to be connected with the central point (healing point or our bodies); for example, Ogawa and Sasaki[27] reported that they tested thoughtography against a photo sensor in a dark case and observed anomalous signals with 100 Hz signals which were presumed as flicker of room light. Researchers of Fudan University[28,29] (Shanghai, China), reported that they wrote color-letters on a transparent sheet as clairvoyance targets, and piled the sheet with color filters and a photo printing-paper, then sealed them. When clairvoyance was succeeded, the photo printing-paper was sensitized as if it irradiated with room light. And when the whole process of the experiment was conducted in a darkroom, sensitization was not observed even if clairvoyance was succeeded. Moreover, they also reported that similar phenomena were observed in tests of psychokinesis.

Results of Ogawa, Sasaki and Fudan group have showed that there is an information transfer between the focus point and central point (our bodies). Thus, there is a possibility that healers collect some "information" with "energy" from space around them. It is similar to PMIR.
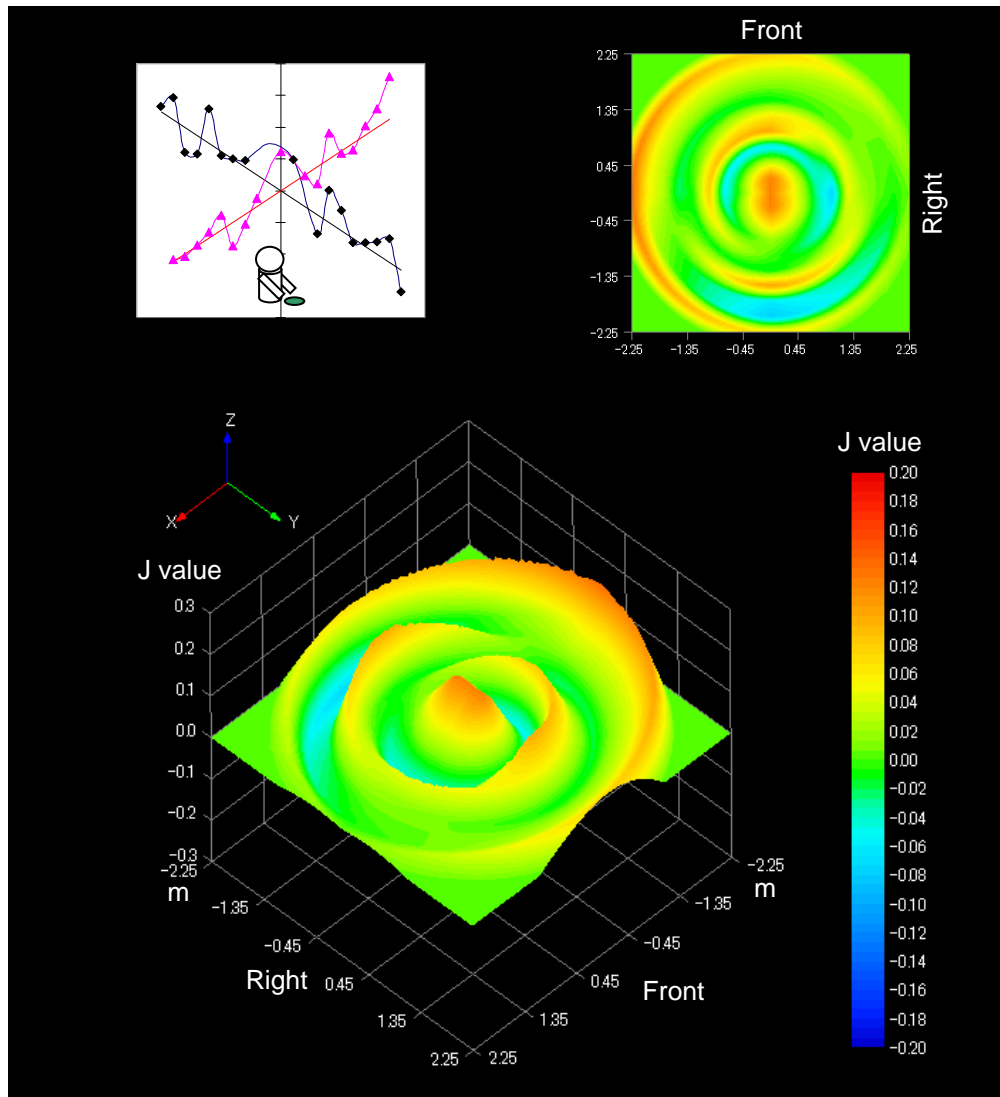

Fig. 15 Estimated Potential Distribution of Healing Power (5 volunteers healers, 10 data)
$J_0 = 0.124$. Original spatial resolution was 25cm.

FURTHER TASKS

The items below should be discussed in further studies.
   (1) Spatial resolution was 25 cm in the present study, but it should be improved.
   (2) Oblique directions and vertical directions should be measured.
   (3) Reliability of data of potential measurements should be improved by SCAT.
   (4) New methods are needed to analyze data when healers failed to concentrate their power on the target well.
   (5) It should be studied whether a layer-structure is generated around a person when he does not emit healing power.
   (6) To test a possibility that healing power can be interacted with electric devices.
   (7) We should develop a real-time sensor to study dynamics of potential distribution.

CONCLUSION

A wave-like potential distribution was generated around a human body during a healing task. This potential distribution partially supports an empirical claim that a human body is surrounded by an invisible layer-structure.
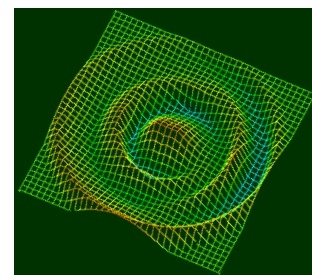
ACKNOWLEDGEMENTS

REFERENCES

1) Kokubo H, Yamamoto M and Kawano K: Evaluation of non-contact healing using biophotons. *Journal of International Society of Life Information Science*, **24**(2): 320-327, 2006.

2) Kokubo H, Yamamoto M and Kawano K.: Study of non-contact healing using biophotons. *Japanese Journal of Parapsychology*, **11**(1&2): 21-28, 2006. [in Japanese]

3) Kokubo H, Yamamoto M and Kawano K: Standard evaluation method of non-contact healing using biophotons. *Journal of International Society of Life Information Science,* **25**(1): 30-39, 2007.

4) Kokubo H, Yamamoto M and Kawano K: Aging develops a person's spiritual healing ability for pain - Application of standard evaluation method of non-contact healing using biophotons. *Journal of International Society of Life Information Science*, **25**(1): 40-62, 2007.

5) Kokubo H and Yamamoto M: Comparing non-contact healing with thermal and lighting conditions. *Thesis- The World Qigong Forum 2007*, pp.24-27, 2007.

6) Kokubo H and Yamamoto M: Discussion on standard evaluation method of non-contact healing using biophotons -Normality of J value, and comparing non-contact healing with thermal/lighting conditions-. *Journal of International Society of Life Information Science*, **25**(2): 219-232, 2007.

7) Kokubo H and Yamamoto M: Discussions on characteristic points of healers and ways - Study of non-contact healing using biophotons -. *Japanese Journal of Parapsychology*, **12**(1&2): 32-39, 2007. [in Japanese]

8) Kokubo H and Yamamoto M.: Research on emission mechanisms of biophotons from cucumber. *Journal of International Society of Life Information Science*, **26**(1): 53-58, 2008.

9) Kokubo H: Biophotons reveal properties of non-contact healing – New perspective from quantitative index -. *Proceedings of 4th Psi Meeting*, Curitiba, Brazil, pp. 171-187, 2008.

10) Kokubo H and Yamamoto M: Quantitative measurements of non-contact healing using biophotons. *Proceedings of 51st Annual Convention of Parapsychological Association*, 348-351, 2008.

11) Kokubo H, Yamamoto M and Kawano K: Magnetic stimuli for pieces of cucumber -Quantitative measurement using biophotons-. *Journal of International Society of Life Information Science*, **26**(2): 213-222, 2008.

12) Kokubo H, Yamamoto M and Kawano K: Kyuuri no baiofoton-hakkou ni ataeru jiki-sigeki to hi-sesshoku hi-ringu no eikyou (Magnetic and healing effects on biophotons from cucumber). *Journal of Japan Medical Conference on Magnetism*, **33**: 19-24, 2008. [in Japanese]

13) Kokubo H and Yamamoto M: Electromagnetic stimuli for cucumber -Quantitative measurements using biophotons-. *Japanese Journal of Parapsychology*, **13**(1&2): 27-35, 2008. [in Japanese with an English abstract]

14) Kokubo H and Yamamoto M: Wave Length and Photon Emission from Cucumber - Effects of 70GHz extremely high frequency (EHF) and non-contact healing. *Journal of International Society of Life Information Science*, **27**(1): 78-89, 2009

15) Kokubo H and Yamamoto M: Controlled healing power and ways of non-contact healing. *Journal of International Society of Life Information Science*, **27**(1): 90-105, 2009.

16) Kokubo H, Takagi O and Yamamoto M: Development of a gas measurement method with cucumber as a bio-sensor. *Journal of International Society of Life Information Science*, **27**(2): 200-213, 2009.

17) Kokubo H, Koyama S and Takagi O: Relationship between biophotons and gases generated from cucumber pieces. *Journal of International Society of Life Information Science*, **28**(1): 84-94, 2010.

18) Kokubo H, Takagi O and Koyama S: Application of a gas measurement method – Measurement of ki fields and non-contact healing-. *Journal of International Society of Life Information Science*, **28**(1): 95-112, 2010.

19) Kokubo H and Takagi O: *Gasu Sokutei-hou no Jissai (How to Use the Gas Measurement Method) – Textbook of Seminar*. Chiba: International Research Institute, 2010. [in Japanese]

20) Kokubo H, Takagi O, Koyama S and Yamamoto M: Gas measurement method for a quantitative study on non-contact healing – A new method using cucumber as a bio-sensor. *Abstracts of Presented Papers of 53rd Annual Convention of Parapsychological Association*, 57, 2010.

21) Kokubo H, Takagi O, Koyama S and Yamamoto M: Spatial distribution of potential of controlled healing power – Exploratory measurement using cucumber as a bio-sensor –. *Journal of International Society of Life Information Science*, **28**(2): 236-249, 2010.

22) Kokubo H, Takagi O, Koyama S and Yamamoto M: Spatial distribution of invisible power around a healer: Advanced application of gas measurement method using cucumber as biosensor. *Proceedings of 6th Psi Meeting*, 88-99, 2010.

23) Radin D, Taft R and Yount G: Possible effects of healing intention on cell cultures and truly random events. *Proceedings of 46th Annual Convention of Parapsychological Association*, 162-182, 2003.

24) Kokubo H, Takagi O, Koyama S and Yamamoto M: Discussion of an approximated equation for spatial distribution of controlled healing power around a human body. *Journal of International Society of Life Information Science*, 29(1): 23-46, 2011.

25) Hatanaka A: *Midori no Kaori - Shokubutsu no Idainaru Chie (Green Odor - Great Plants)*. Tokyo: Maruzen, 2005. [in Japanese]

26) Hasted J: *The Metal-benders*. London: Routledge, 1981.

27) Ogawa Y and Sasaki S: Some aspects of nen-field as paranormal phenomena in the darkened box during nen-graphy process - Analysis of wave form - Part 1. *Journal of Psi Science Institute of Japan*, 4(1): 2-9, 1979. [in Japanese with an English abstract]

28) Shao L, Zhao Z, Zhang L, Zhang M, Zhou Y et al: Quang cahnyu renti teyigongneng zuoyong de shiyan yanjiu (Experimental studies on human psi ability relating to light). in Somatic Information Research Group, Dept. of E.E., Fudan University ed.: *Renti Teyigongneng de Shiyan Yanjiu yu Youfa Xunlian (Experimental Research for Human Psi Ability and Conducive Training)*. pp.86-93, Shanghai: Fudan University Publisher, 1995. [in Chinese]

29) Shao L, Zhao Z and Fang L: Quang jianjie cahnyu renti teyigongneng zuoyong de shiyan baogao (Report of experiments on human psi ability with indirect relationship of light). in Somatic Information Research Group, Dept. of E.E., Fudan University ed.: *Renti Teyigongneng de Shiyan Yanjiu yu Youfa Xunlian (Experimental Research for Human Psi Ability and Conducive Training)*. pp.94-100, Shanghai: Fudan University Publisher, 1995. [in Chinese]

Correspondence author

    Hideyuki Kokubo
    Research Director
    International Research Institute (IRI)
    40A, Yuuki Bldg., Sonno 1108-2, Inage, Chiba 263-0051 JAPAN
      kokubo@a-iri.org
      nbb03272@nifty.ne.jp

 * Some papers are available through online databases such as CiNii (http://ci.nii.ac.jp/)

** Some papers are uploaded to http://homepage2.nifty.com/anomalousphenomena/