

## Brain Blood Flow Change with functional Near Infrared Spectroscopy While Guessing

Hideyuki KOKUBO<sup>1,2,3</sup>, Mikio YAMAMOTO<sup>1,2,3</sup>, Tsuneo WATANABE<sup>3,2,1</sup>, Kimiko KAWANO<sup>4,1,2,3</sup>  
and Kazumi SAKAMOTO<sup>5,2</sup>

<sup>1</sup> *Institute for Living Body Measurements, International Research Institute (Chiba, Japan)*

<sup>2</sup> *Center for the Environmental Study of Life and Mind, Faculty of Science, Toho University (Funabashi, Japan)*

<sup>3</sup> *Department of Environmental Science, Faculty of Science, Toho University (Funabashi, Japan)*

<sup>4</sup> *Centre for Informatics and Sciences, Nippon Medical School (Tokyo, Japan)*

<sup>5</sup> *Department of Physics, Faculty of Science, Toho University (Funabashi, Japan)*

**Abstract:** In a previous study using functional near-infrared spectroscopy (Yoichi et al, 2002), the authors found spontaneous blood flow change often occurred at both temporal lobes while guessing for hidden figures (clairvoyant condition). This phenomenon has a relationship to the degree of impression formulation of figures (Kokubo, et al., 2005). These studies were forced choice tests. In the present study, the authors researched the brain blood flow change in free-response guessing tests chiefly. Subjects were 11 healthy volunteers. Targets were geometric symbols, the inside of human body or a thing in a dark box. Brain blood flow was measured at frontal area and right temporal area while guessing the targets from 3 to 30 minutes. Results, star psychics showed the increase of blood flow at their prefrontal areas, not right temporal lobes. While the other subjects showed the increase of blood flow at their right temporal lobes, not frontal area. In case that the task was to guess the hidden visual targets, the activated areas of the brain of star psychics were different from ones of the other persons.

**Keywords:** fNIRS, functional near-infrared spectroscopy, temporal lobe, prefrontal area, guess, blood flow change, clairvoyance, ESP

### 1. Introduction

In previous studies<sup>1-3)</sup> using functional near-infrared spectroscopy (fNIRS), the authors found spontaneous blood flow change often occurred at both temporal lobes while guessing for hidden figures (clairvoyant condition). This phenomenon has a relationship to the degree of impression formulation of figures. These studies were forced choice tests.

In the present study, the authors researched the brain blood flow change in the free-response guessing tests chiefly; which are considered as that the situation is more similar to the ordinary life. Majorities of subjects were various experts; for example, abacus and mental arithmetic, boxing, healing, remote viewing. Their brain blood flows were measured at the frontal area and right temporal area to research different or common properties.

### 2. Methods

**Term and Facility:** The study was done at the Research Laboratory of the Institute for Living-Body Measurements at the Information and Research Center of the International Research Institute, and Shimadzu Corporation from October 6th to November 14th, 2005.

**Subjects:** Subjects were 11 healthy volunteers (5 males, 6 females): average age was 39.7 (SD=12.1) years old. They were an ordinary person, an expert of abacus and mental arithmetic (whose grade was the 10 grade), a pro boxer, a remote viewer, 5 healers and 2 star psychics.

**Physiological Measurements:** Brain blood flow was measured by OMM-3000 (Shimadzu, Japan)<sup>4)</sup> which uses 3 near-infrared lasers (wavelengths: 780, 805 and 830nm). There were a maximum of 16 emitting and receiving probes. The measurement area was mainly at the right temporal lobe; 6 runs (18 trials) were done at the right temporal lobe; 16 runs (48 trials) were at the right temporal and frontal lobes; 1 run (3 trials) was at

---

Hideyuki KOKUBO      kokubo@a-iri.org  
International Research Institute (IRI), 40A, KK Bldg., 1108-2,  
Sonno, Inage, Chiba 263-0051 Japan  
Phone: +81-043-255-8851    FAX: +81-43-255-8852

motor area. Moreover, skin conductance and pulse of several subjects were also measured by MP150 (BioPack, USA) at 200Hz. Skin conductance was measured at the second joints of both second and fourth fingers of the subjects' left hands by the exosomatic method (DC 0.5V constant). The pulse was measured at the tip of the middle finger of the subjects' left hands.

**Target and Response:** The experimental conditions of the forced choice test were as same as ones of the previous experiments<sup>3)</sup>. But subjects also were allowed to use their methods, not the instructed methods, if they had learn some techniques well to guess; for example, systematic remote viewing.

The targets of the free response tests were the inside of human body or a small thing in a dark box.

In case of that the target was the inside of the human body, one trial was a 3-minute guessing to find sickness-and-wound parts. Subjects answered orally after the task.

In case that the target was the thing, one trial was 3 to 30 minutes. Subjects tried to guess the shape of the target and drew its figure on papers by hand. Moreover, to check a possibility that anomalous photons appeared near the target in the dark box, the target was monitored by three cameras; super high sensitive CCD camera (C2400-27, Hamamatsu Photonics, Japan) which had an image intensifier to detect super weak photons; high sensitive CCD camera (KPC-EX20B, KT&C, Korea); low sensitive CCD camera (CCD-PC1, Sony, Japan).

Furthermore, the target thing was set in a magnetic shielding case with two open halls but only once.

### 3. Results

**Figs. 1-8** show examples of brain blood flow changes as instant mapping.

**Figs.1 and 2** show brain activities of star psychics while guessing. A common activated area was the prefrontal area. Subject T001 (female, 14 ages) of **Fig. 1** claims that she guesses abnormal points through comparing visual images of internal-organs of the target person with pictures of normal internal-organs in her memory (she has already learned them by medical books). Her inner work of comparing was considered to activate non-prefrontal areas. In **Fig. 2**, Subject W003 (female, 37 ages) showed activated areas in her left

hemisphere. The reason was considered that she did the task talking her impression sometimes.

**Figs. 3-5** show results that subjects tried to guess sickness-and-wound parts inside the target persons. Their temporal lobes were activated clearly while formulating visual images, but their prefrontal areas were not activated relatively.

**Figs. 6-8** show examples of the results of the forced choice test which target was selected from 5 geometric symbols at random. In each case, the temporal lobe was activated clearly. Subject S005 (male, 45 ages) of **Fig. 6** was an expert of remote viewing. He guessed the target, writing results of analyses on papers according to Psi Tech's techniques. Therefore his sensory-motor area was also activated.

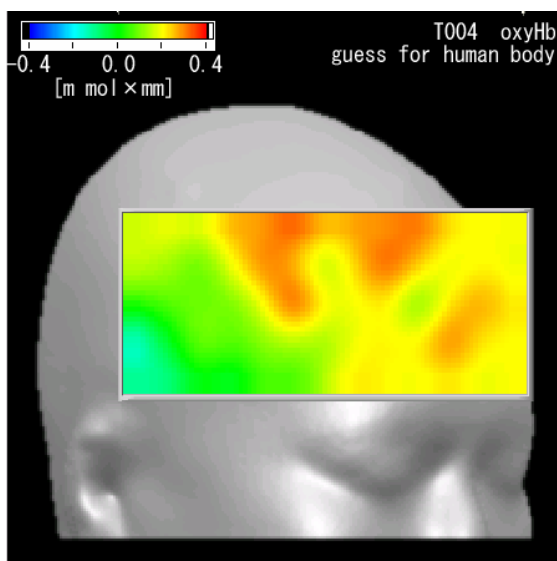
### 4. Discussions

In the present study, the two psychics were said as psychics by natural. While many of other subjects were who did not have special abilities or who trained themselves to develop their potentials. In the range of the cerebral cortex which can be measured by fNIRS, even if the guessing tasks are the same, the degree of activation of the prefrontal area of genius psychics is much different from ones of other persons.

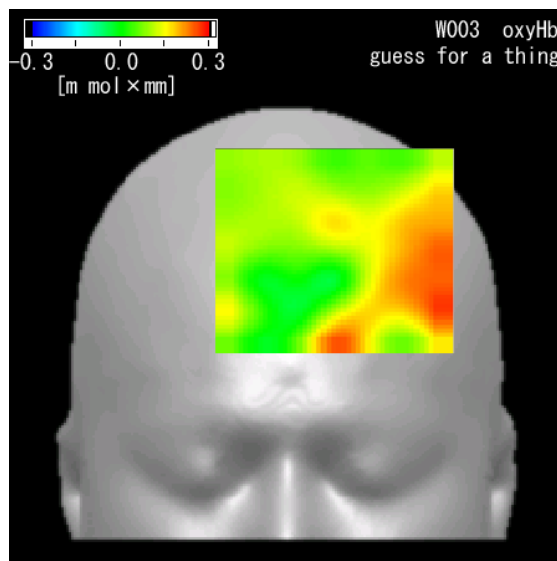
In previous and present studies<sup>1-3)</sup>, the authors have given subjects instructions to simulate specific mental activities which are considered to be done by psychics if subjects do not have any guessing techniques such as remote viewing. The authors made the instructions based on hearing to psychics and training techniques which were developed in China in 1980's<sup>6,7)</sup>. The important point of the instructions is "Be devoted only to guessing a target during subject execution." However, as results, it had not become the instructions which subjects copy the brain activities of psychics. Even if the task requires subjects to formulate figure images, the process of image formulation is not important, especially for such as the present study. The instructions should be revised.

### 5. Conclusions

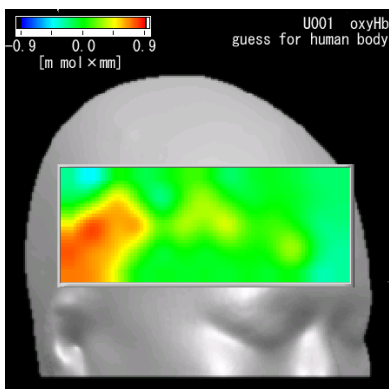
The authors gave guessing tasks of formulating figure images to expert subjects of mental arithmetic, boxing, healing, remote viewing etc. Results, the brain



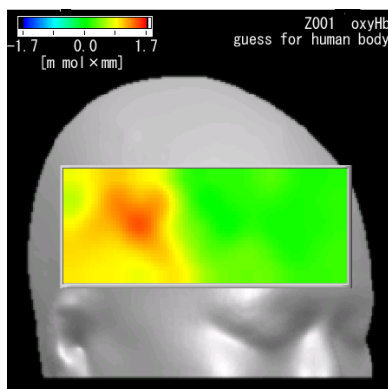
**Fig.1 Russian Psychic Healer**  
 OxyHb, Averaging 140s. Target: Human body.



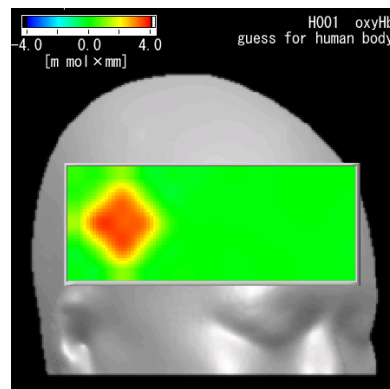
**Fig.2 Chinese Psychic**  
 OxyHb, Characteristic pattern. Target: A thing.  
 The figure of right temporal lobe was omitted.



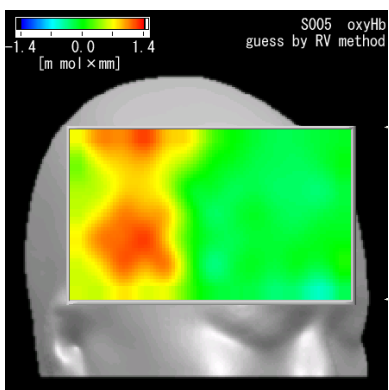
**Fig.3 Pro Boxer**  
 OxyHb. Target: Human Body.



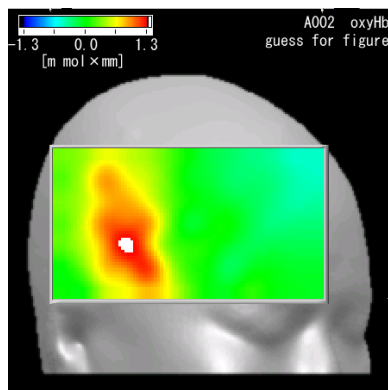
**Fig.4 Master of Qigong Healing**  
 OxyHb. Target: Human Body.



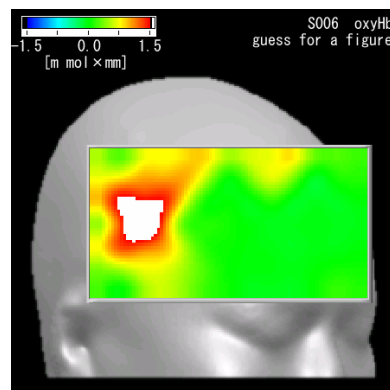
**Fig.5 Master of Mental Arithmetic**  
 OxyHb. Target: Human Body.



**Fig.6 Remote Viewer**  
 OxyHb. Target: A figure. Forced choice.



**Fig.7 Healer**  
 OxyHb. Target: A figure. Forced choice.



**Fig.8 Healer**  
 OxyHb. Target: A figure. Forced choice

blood flow at the prefrontal area of psychics increased obviously, but other subjects did not show the increase of blood flow at the prefrontal area even the flow increased at the right temporal lobe.

### Acknowledgements

The authors express their sincere thanks to the subjects and collaborators; Miss. Yana Troinich, Mrs. Ping Wang, Mr. Yongxiang Zhang et al.

This study is supported by the Bial Foundation (Portugal). The Foundation is gratefully acknowledged.

### References

- 1) Yoichi H, Kokubo H, Chen W, Zhang T, Haraguchi S, Kawano K and Yamamoto M: Brain blood volume change under and ESP task measured by optical topography, *J Intl Soc Life Info Sci.* **20**(2): 637-641, 2002.
- 2) Kokubo H, Yamamoto M and Watanabe T: Impression and spontaneous blood flow change at the temporal lobe while guessing for a hidden figure, *J Intl Soc Life Info Sci.* **23**(2): 306-313, 2005.
- 3) Kokubo H, Yamamoto M and Kawano K: Research on brain activities by functional near infrared spectroscopy while guessing for hidden figures, *Japanese Journal of Parapsychology*, 10(1&2): 33-36, 2005. [in Japanese]
- 4) Chen W, Zhang T, Wang F, Kokubo H and Yamamoto M: Change of hemoglobin concentration of cerebral cortex and respiration frequency during qi-emission task, *J Intl Soc Life Info Sci.* **21**(2): 473-492, 2003.
- 5) Elliott R, Rees G and Dolan RJ: Ventromedial prefrontal cortex mediates guessing, *Neuropsychologia*. Apr; **37**(4): 403-11, 1999.
- 6) Kokubo H and Yamamoto M: Yunnan's Procedure of Screening Test for Anomalous Somatic Functions, *Japanese Journal of Parapsychology*, **4**(1): 3-11, 1999. [in Japanese]
- 7) Kokubo H, Da Silva FE, Pilato S, Hiraoka R and Yamamoto M: Application of Psi Inductive Training for Brazilian Children, *J Intl Soc Life Info Sci*, **23**(1): 179-188, 2005.