A Study on Magnetic Cure System Depending on Dominant Direction of Meridian using Heating Diagnosis Method

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Abstract In this paper, we measured the heating time on the key measuring point of the meridian of the human body's left and right by using heating machine. Then, based on the fuzzy theory, this study diagnosed the each meridian's strength and weakness. After that, both the strengthening and weakening stimulus of magnetic field was applied to the dominant direction to find out how the degree of strength and weakness of the meridian changed. Ultimately, the magnetic therapy that can stimulate the magnetic field at the time of diagnosis and thereby balancing the interactive of a five system has been materialized. For the stimulation of magnetic field, a stimulating device which can change the direction and time on a specific part of the key measuring points has been developed and used. The therapeutic method is as follows. First, the strength and weakness of the meridian has been determined. Second, both the extremely weak meridian of Yin(Shade) and Yang(Shine), and the extremely strong meridian of Yin and Yang were adjusted by applying appropriate ascending and descending stimuli respectively.

1. Introduction

Recently, the basic research which is supported by engineering has been studied in order to develop oriental medicine scientifically. However, the research only has been limited to quantization, visualization and generalization of biological signal. In this paper, we propose 'magnetic cure system depending on dominant direction of meridian using heating diagnosis method to grasp totally the state of meridian and to balance the Yin/Yang and interactive of a five system.

2. Meridian and dominant direction

Meridian is classified by weakening state, normal state and stimulating state. There are 12 kyungmaks in the meridian and 24 representative points in the body. Representative acupoints, weakening points, stimulating points and interactive of five system are shown as Table 1[1].

Table 1. Representative acupoint, weakening point, stimulating point and interactive of five system.

symbol	H1	H2	H3	H4	H5	H6
臟腑	肺	大腸	心包	三焦	心	小腸
代表測定点	少商	商陽	中衝	關衝	少衝	少澤
興奮点	太淵	曲池	中衝	中渚	少衝	後谿
抑制点	尺澤	二間	太陵	天井	神門	小海
陰陽	陰	陽	陰	陽	陰	陽
五行	金	金	相火	相火	君火	君火

symbol	F1	F2	F3	F4	F5	F6
臟腑	脾	肝	胃	膽	腎	膀胱
代表測定点	隱白	大敦	厲兌	竅陰	足9	至陰
興奮点	太都	曲泉	解谿	俠谿	復溜	至陰
抑制点	商丘	行間	厲兌	陽輔	湧泉	束骨
陰陽	陰	陰	陽	陽	陰	陽
五行	土	木	土	木	水	水

Fig. 1 and Fig. 2 show representative measuring points of hand kyungmak, junghyuls and dominant direction: where big circle is representative measuring point and small circle is junghyul.
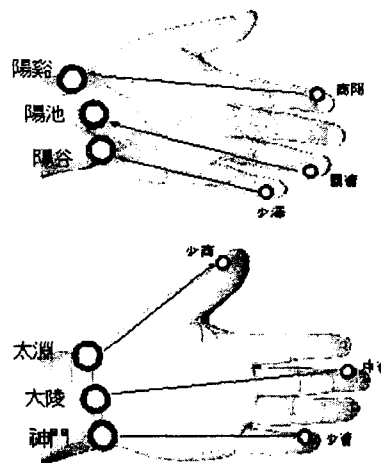

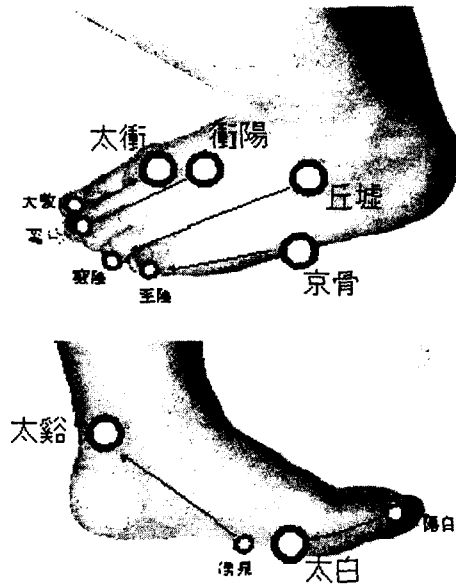Fig. 1. Representative measuring points of hand kyungmak, junghyuls and dominant direction

Fig. 2. Representative measuring point of foot kyungmak, junghyul and dominant direction

3. System Configuration

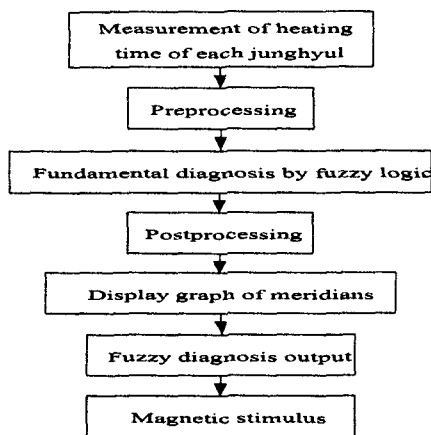The system is composed by PC 1set(Pentium), heater, magnetic stimulus pact.

Fig. 3. Sequence of system.

Fig. 3 shows the sequence of system. First, we measure the heating time of 24 junghyuls using heating machine. Here heating time means the time required a patient feel abrupt pains when his junghyuls are warmed by heater. Preprocessing is that measured value multiply by weight described in table 2 and generalize the value.

Table 2. The weight of Meridians.

木經絡	1.1
火經絡	1.2
土經絡	0.8
金經絡	0.9
水經絡	0.8

Generally, two diagnostic reference is presented in meridian measurement. First, if the value is bigger 20% than the average value, it means strength. If the value is smaller 20% than the average value, it means weakness. Secondly, if the differnce of left-side value and right-side value is big, then we diagonsis it means strength or weakness. The fuzzification method is Non-singleton, fuzzy Inference method is Min-Max composition and defuzzification method is Centroid method[2-3].

The membership function of input V is shown as Fig. 4, the linguistic variables are shown as Table 3, where □(V) is the membership value of V.

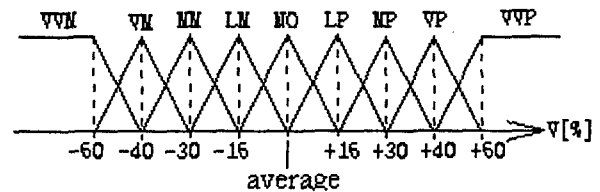Fig. 4. Membership function of input V.

Table 3. Linguistic variable set of input V.

HA	Harmony
LD	Little Disharmony
MD	Middle Disharmony
VD	Very Disharmony
VVD	Very Very Disharmony

The membership function of input M is shown as Fig. 5, the linguistic values are shown as Table 4. where □(M) is the membership value of M.
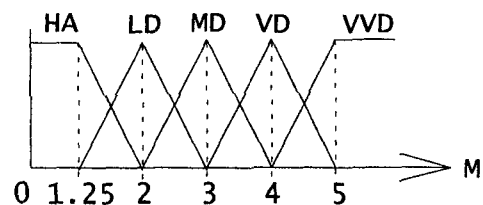

Fig. 5. Membership function of input M.

Table 4. Linguistic variable set of M.

VVP	Very Very Plus
VP	Very Plus
MP	Middle Plus
LP	Little Plus
NO	Normal
LM	Little Minus
MM	Middle Minus
VM	Very Minus
VVM	Very Very Minus

Also, the membership function of output G is shown as Fig. 6, linguistic values are shown as table 5. where □(G) is the membership value of G.
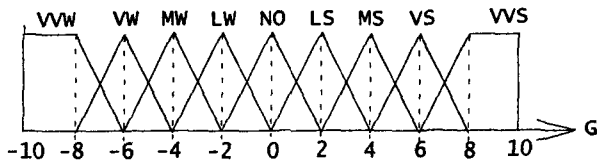
Fig. 6. Membership function of output G.

Table 5. Linguistic variable set of output G.

VVS	Very Very Strong
VS	Very Strong
MS	Middle Strong
LS	Little Strong
NO	Normal
LW	Little Weak
MW	Middle Weak
VW	Very Weak
VVW	Very Very Weak

The rules of fuzzy diagnosis is shown as Table 6.

Table 6. Rule table of fuzzy diagnosis.

M\V	VVP	VP	MP	LP	NO	LM	MM	VM	VVM
HA	VS	LS	NO	NO	NO	NO	NO	LW	VW
LD	VS	MS	LS	NO	NO	NO	LW	MW	VW
MD	VVS	VS	MS	MS	NO	MW	MW	VW	VVW
VD	VVS	VVS	VS	MS	NO	MW	VW	VW	VVW
VVD	VVS	VVS	VS	VS	NO	VW	VW	VVW	VVW

Fig. 7 shows Right hand attatching magnetic stimulus pact. Here magnetic stimulus is about 400 Gauss.
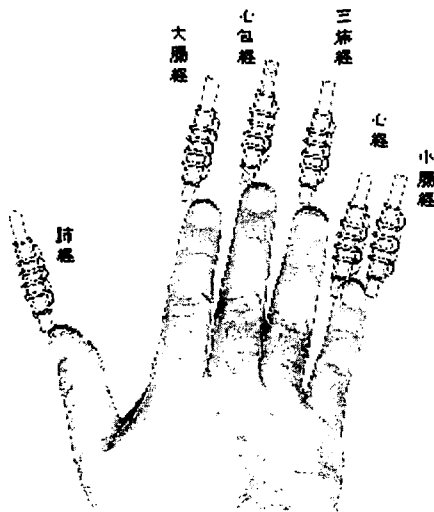

Fig. 7. Right hand attatching magnetic stimulus pact.

3. Result of experiment

The system was programmed using Visual Basic 6.0. Result of experiment is like below.

Table 7. Heating time of kyungmks for 2 experimentalists.
(units: sec)

date			1/6 before		1/6 after
手經眠	肺	left	9		9
	↑ 1	right	9		14
	大腸	left	9		9
	↓ 3	right	14	↓	11
	心包	left	9		9
	↑ 5	right	13		12
	三焦	left	12		14
	↓ 8	right	8		11
	心	left	9		8
	↑ 9	right	8		9
	小腸	left	9		10
	↓ 10	right	10		10
足經眠	脾	left	10		10
	↓ 1	right	11		13
	肝	left	14		10
	↓ 2	right	9		9
	胃	left	16	↑	9
	↑ 4	right	10		10
	膽	left	8		10
	↑ 8	right	13	↑	10
	腎	left	14		10
	↓ 9	right	13		10
	膀胱	left	23	↑	14
	↑ 10	right	30	↑	14

Experimentalist 1

date			1/6 before		1/6 after
手經眠	肺	left	8		10
	↑ 1	right	11		7
	大腸	left	6	↑	7
	↓ 3	right	6	↑	6
	心包	left	8		7
	↑ 5	right	7		7
	三焦	left	6		6
	↓ 8	right	7		7
	心	left	7		8
	↑ 9	right	13	↑	7
	小腸	left	7		6
	↓ 10	right	5		7
足經眠	脾	left	6	↑	5
	↓ 1	right	4	↑	6
	肝	left	6		6
	↓ 2	right	7		5
	胃	left	4	↓	6
	↑ 4	right	10		5
	膽	left	9		8
	↑ 8	right	9		6
	腎	left	11		7
	↓ 9	right	5	↑	7
	膀胱	left	13	↑	10
	↑ 10	right	15	↑	11

Experimentalist 2

Table 8. Result of fuzzy diagnosis (Experimentalist 1).

	肺	大腸	心包	三焦	心	小腸	脾	肝	胃	膽	腎	膀胱
左	14.3	14.4	10.9	7.4	10.9	10.9	14.5	5.8	9.2	11.6	10.6	1.5
右	14.3	9.3	5.5	11.8	11.9	9.8	13.1	11.6	14.5	7.7	11.2	1.5

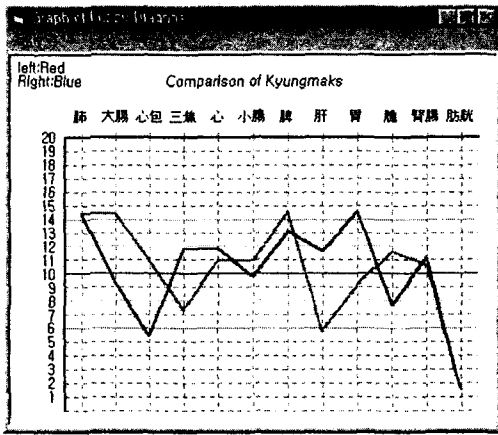|	肺	大腸	心包	三焦	心	小腸	脾	肝	胃	膽	腎	膀胱
左	MS	MS					MS	MW				VVW
右	MS		MW						MS			VVW

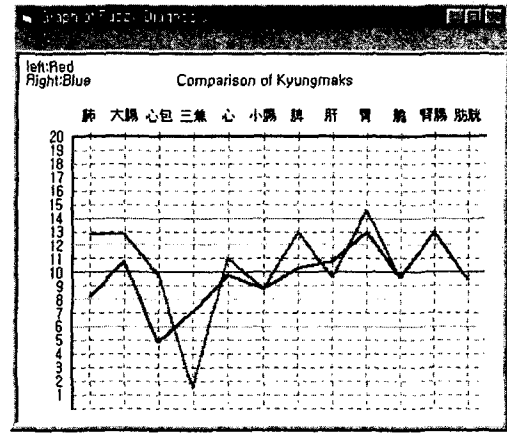Fig. 8. Graph of fuzzy diagnosis (Experimentalist 1).

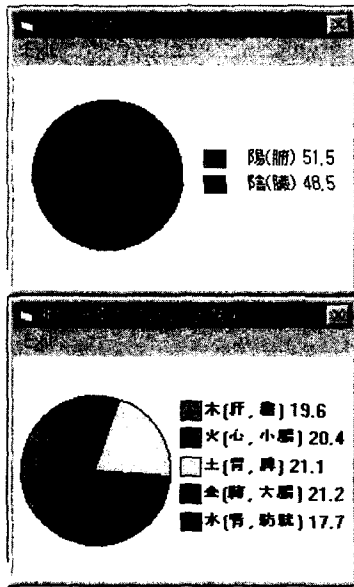Fig. 10. Updated Graph of fuzzy diagnosis (Experimentalist 1).

Fig. 9. Graph of Yin/Yang and interactive of five system (Experimentalist 1).
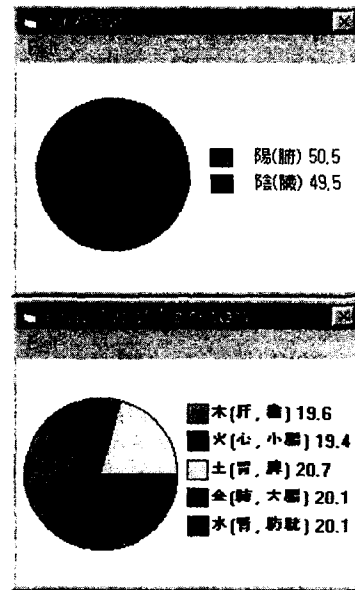

Fig. 11. Updated Graph of Yin/Yang and interactive of five system (Experimentalist 1).

Table 9. Result of fuzzy diagnosis (Experimentalist 1).

The result of fuzzy diagnosis is like Table 8. Upper block displays the output of each kyungmak and lower block does output, which is displayed by space in normal case. In Fig. 8, center line means average value. Upper and lower lines mean +20% and -20% of average value respectively. Fig. 9 below display graphs which is compared with Yin/Yang, and the interactive of five system. Table 9, Fig. 10 and Fig. 11 show the updated results after magnetic stimulus.

4. Conclusion

In this paper we have studied heating diagnosis and magnetic stimulus for balancing Yin/Yang and interactive of five system. Experimental results showed that disharmony state of meridian had changed to harmony state. But more study is needed to prove the effect of cure system.

Reference

[1] Su-Jin Kim, Computer meridian diagnostic machine, Sord Medicom, 1993.
[2] Li-Xin Wang, "*Adaptive Fuzzy Systems and Control: Design and Stability Analysis*", Prentice Hall International Inc., 1994.
[3] Kwang-Hyung Lee, Kil-Log Oh, Fuzzy Theory and application, Hongnung Pub., 1991.

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