

Diagnosis, Treatment and Prevention of Autism via Meridian Theory

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Abstract: A twelve-week pilot study was conducted on 11 male children, aged five to 19 years, who had ASD (autistic symptom disorder) of varying degrees of severity. These eleven subjects were each examined three times in the 12-week period: at the first week, 6th week, and 12th week. During each examination, two sets of full-body thermographs were taken of each child, before and fifteen minutes after drinking a solution of stable water clusters with a double helix configuration. This solution of stable water clusters is called double helix water (DHW). In the before thermographs, a consistent thermal pattern of six hot regions of body surface temperature were identified. They are: left and right upper forehead region of the face; left and right area in front of the center of the ear; left and right area of the inner extreme point of the eye; left and right collarbone region; left and right side neck region; and left and right armpit region. These areas may be interpreted as regions surrounding various acupoints along the GB, BL, ST, SI, SJ meridians. These meridians are yang meridians that on one end reach the head, and hence have branches reaching into the brain, and on the other end reach to the gastrointestinal tract and urinary bladder system. Thus, they can be considered to explain the major clinical symptoms of ASD. These thermal patterns, if confirmed in a larger clinical study, may lead to a new way to diagnose ASD, and to test the effectiveness of any treatment. When such a thermal pattern is discovered early, say around the age of 18 months, preventive action can be initiated before observation of any behavior disorder. We simultaneously studied the healing effect of stable water clusters with double helix configuration (DHW) on these subjects. The quantitative reduction of maximum temperature at these six regions was calculated. A consistent reduction was noted and suggests a positive healing effect taking place within a very short time period (fifteen minutes), and lasting over a long time period (12 weeks). Quantitative evaluation by the parents over the 12-week period showed that eight out of 11 children had physiological and behavioral improvement. Our findings with these small numbers suggest a reliable method of

early diagnosis/detection and also an effective treatment of ASD. We therefore conclude that a study of larger numbers of children with ASD should be conducted.

Keywords: Double Helix Water; Meridians; Autistic Symptom Disorder (ASD); Stable Water Clusters.

Introduction

According to the official DSM V, autistic spectrum disorder (ASD) is defined as a neuro-developmental behavior disorder (American Psychiatric Association, 1994) and is considered to be a brain dysfunction. There are some authors who argue that ASD might be related to gastrointestinal diseases (Afzal *et al.*, 2003; Herbert, 2005; Horning *et al.*, 2002; Horvath *et al.*, 2002; Valicenti-McDermott *et al.*, 2006), others who suggest that it may be an autoimmune disease (Ashwood *et al.*, 1994), and still others advocating a viral causation. Traditional Chinese medicine has used acupuncture and qigong massage to treat ASD with varying degrees of success (Ayres *et al.*, 2009; Chan *et al.*, 2009; Hui *et al.*, 2010; Jia *et al.*, 2008; Ma *et al.*, 2006; Wong and Sun, 2010; Yan *et al.*, 2007; Yuan *et al.*, 2009a; 2009b). This study seeks a fundamental understanding of ASD through the meridian theory, with the quantitative analysis obtained by an infrared imaging system, which produces thermographs.

Materials and Methods

Analysis of Thermographs with the Meridian System

According to the meridian theory, there are six yang meridians that converge in the head: Stomach meridian (ST), Gallbladder meridian (GB), Bladder meridian (BL), Small intestine meridian (SI), Large intestine meridian (LI), and Triple heater meridian (SJ). These six meridians connect the brain activities to various parts of the body. The organs and tissues along the six meridians in different parts of the body influence the function of the brain. Alternatively, the malfunction of the brain affects the various organs and tissues of the body. The brain does not always assume the dominant position in the behavior of a person. When a person is hungry, the stomach and intestines send a signal to the brain to seek food. Hunger takes control of the action of the person. Part of the neuro-developmental behavior disorder that is ASD, may indeed come from dysfunction of the gastrointestinal system. Thus, it is natural to seek abnormal symptoms in the ST, BL, GB, SI, SJ, LI systems.

One of the most puzzling aspects of the meridian system from the viewpoint of modern scientists is that anatomists have not been able to find any specific tissues (i.e. nerves or blood vessels) following the meridian pattern in the human body. To solve this puzzle, we propose an interesting hypothesis: the meridian system (Lo, 2004; Lo *et al.*, 2009) is made up of stable water clusters, which have a permanent electric dipole moment. The existence of these stable water clusters has now been confirmed by photographic images using the Atomic Force microscope and the Electric Atomic Force microscope. One particular form of these stable water clusters has a double helix configuration and is hereafter referred to as

double helix water (DHW). DHW has been shown in a double blind study of peripheral blood cells to stimulate the production of a significant amount of cytokines, which are responsible for the immune function of the body (Lo *et al.*, 2009). A preliminary study of ten healthy human subjects has also confirmed that interferon-gamma is significantly increased by drinking water that contains this special stable water clusters. We wanted to study the effect of this particular form of stable water cluster (DHW) on subjects with ASD. We chose subjects who had ASD with varying degrees of severity. Each drank an 8-ounce glass (250 ml) of DHW water twice daily. In weeks one, six, and twelve, a complete set of full body thermographs of each subject was taken before drinking the water. A second set of thermographs was taken fifteen minutes after drinking the DHW. The two sets of thermographs were compared.

Thermographs display body surface temperature. Superficially, any abnormal surface temperature indicates only problems with skin. However, according to the meridian theory, meridians connect the surface of the body to internal organs and tissue. Any problem occurring inside the body reveals itself on the surface of the body. It has been shown that connective tissue, where meridians reside, is 600 times more transparent along the grain of the tissue than across it, similar to an optic fiber (Gann and Lo, 2009). Hence, meridians may act like an optical fiber that transmits infrared light from internal organs and tissues to the surface. A higher temperature along the meridians may be interpreted as an inflammatory state of internal organs and tissues. In particular, acupoints along meridians are like deep wells that connect the meridians with the external environment, and may show the higher temperature. Based on these premises, we examined the thermographs with particular attention to the areas along the meridians. The following section is the result of our analysis of the thermographs of these 11 subjects, looking for abnormal temperature distribution along meridians and acupoints.

Abnormal Temperature Distribution along Meridians

Every subject we studied had a set of thermographs taken that showed the distribution of surface temperature of the face, chest, abdomen, front of the legs and feet, back of the legs and feet, lower back, upper back and neck. Then, thermographs of the left and the right sides of the head were taken. For better understanding, thermographs were shown in color: the hottest in white, then red, yellow, green, blue and black as the coldest. The color scale was adjusted so that a green color implied healthy state, with yellow, red, and white representing more and more inflamed tissue, hotter than the normal state. We focused our attention mainly on the very hot areas, which in our present scheme it is red and/or white, with white being the most inflamed. A hot temperature on the body surface along a meridian was interpreted to be inflammation of organs and tissues along that meridian, and was considered to be in an unhealthy state. For example, a hot spot on the frontal leg area where the stomach meridian lies was interpreted as a problem associated with inflammation of the stomach and other organs along the stomach meridian. This could include that part of the brain where branches of the stomach meridian reach from nearby ST1, ST2, and ST8.

After the initial thermographs, each subject was given an 8-ounce glass of DHW to drink. Fifteen minutes later, another set of thermographs of the whole body was taken. The two sets of thermographs were compared. The difference between the maximum temperatures in the areas where the meridians lie is an indication of the effectiveness of DHW on the subject. (Our experience has shown that the numerical values of the differences in maximum temperatures across different parts of the body and over long periods of time are much more reliable indicators of benefit than the absolute temperatures.)

Our findings showed some common hot areas among all the subjects with ASD. We herein present some representative examples of the typically seen hot areas of ASD along the six meridians: Stomach meridian, Bladder meridian, Gallbladder meridian, Large Intestine meridian, Small intestine meridian and SJ meridian. A complete presentation of all 11 subjects' thermographs (which number more than 300) with their numerical analysis can be found on our web site: www.stablewatercluster.net. The eleven subjects are coded as M1 through M11.

Stomach Meridians

The thermographs of subject M10 and M11 are shown in Fig. 1. The stomach meridian starts at acupoint ST1, just under the middle of the eye, and runs down through the cheek to the side of the mouth to acupoint ST4. The line from ST1 to ST4 is observable in red in Figs. 1A and 1C in each of the two subjects before they drank DHW. The body surface temperature along this section of the ST meridian is hotter than the surrounding face temperature. We interpret this as an indication of inflammation of the stomach.

In Fig. 1A, acupoint ST4 is seen at the right end of the mouth. The maximum temperature there is 39.2°C. The subject (M11) was then given an 8-ounce glass of double helix water to drink. Fifteen minutes later, a second picture was taken (Fig. 1B), showing that the maximum temperature fell to 37.8°C, a reduction of 1.4°C. It is known that the statistical fluctuation of skin temperature is about 0.1°C. Our data shows that the reduction

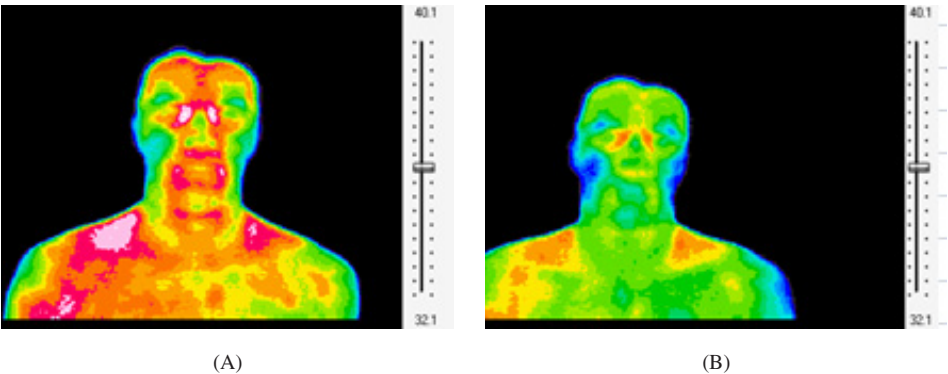


Figure 1. Faces. The top two thermographs (A) and (B) are subject M7 before (left) and after (right) drinking DHW; the bottom two thermographs (C) and (D) are subject M8 before (left) and after (right) drinking DHW.

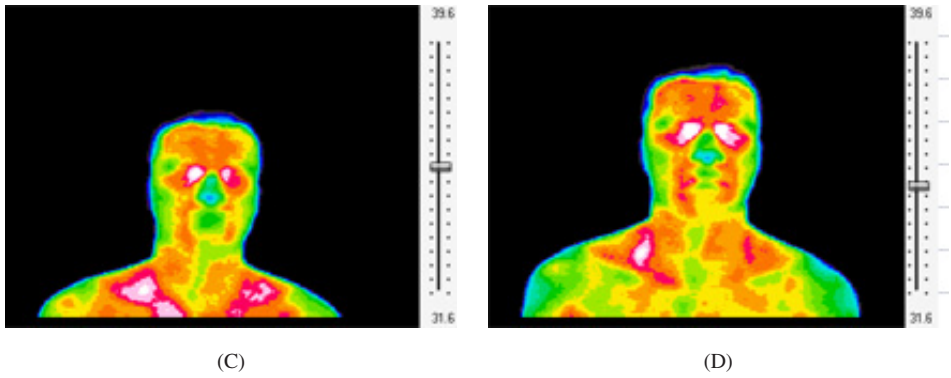


Figure 1. (Continued)

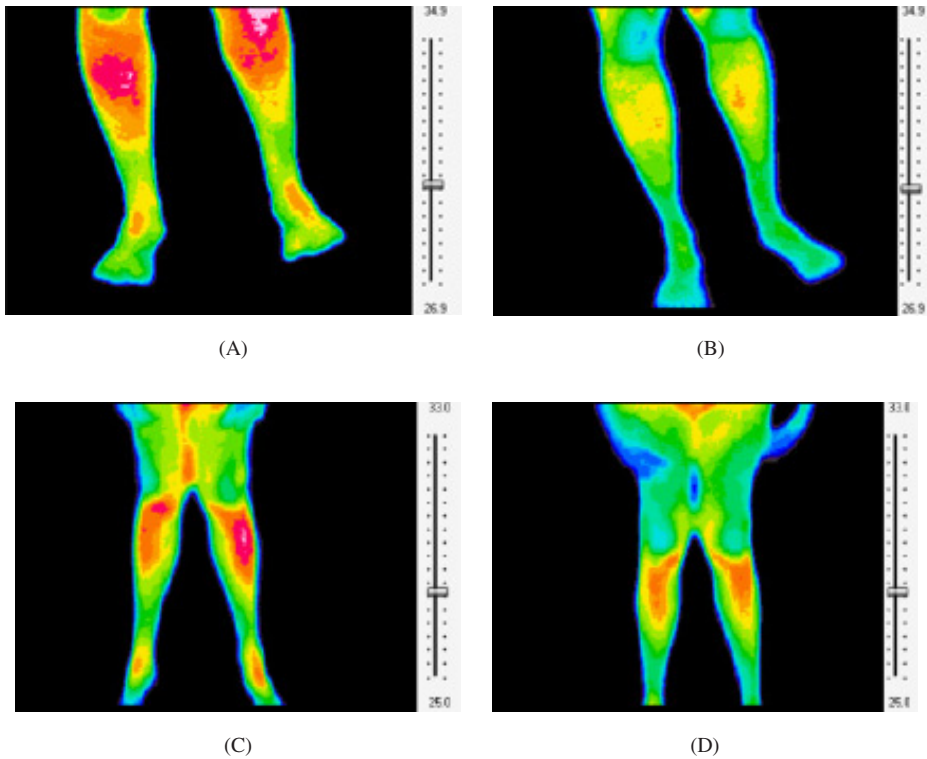


Figure 2. Frontal legs. The top two thermographs (A) and (B) are subject M11 before (left) and after (right) drinking DHW; the bottom two thermographs (C) and (D) are subject M5 before (left) and after (right) drinking DHW.

in temperature of ST4 to be fourteen times larger than the statistical fluctuation, and hence is statistically significant. Similar reductions of maximum temperature are seen at the left end of the mouth at ST4. The maximum temperature is reduced from 39.4°C to 37.9°C, by an amount of 1.5°C. The stomach meridian continues down from the mouth ST4, passes through the region of thyroid in the neck, and turns left and right at the collarbone region to ST12. Our previous experience (Lo, 2002) suggested that the hot area around ST12 probably indicated thyroid dysfunction. The maximum temperatures in the right and left collarbone region (right ST12 and left ST) were cool down from 39.6°C and 39.4°C to 38.7°C and 38.8°C, by amounts of 0.9°C and 0.6°C, respectively.

As the stomach meridians travel down the body, the next area where thermographs show hot (Fig. 2) is the middle frontal leg region in the area of ST37 to ST40. The maximum temperatures at the right and left middle frontal leg region of subject M11 are 34.1°C and 34.3°C, which decrease to 33.3°C and 33.3°C by 0.8°C and 1°C, respectively. For subject M6, the maximum temperature at the right and left middle frontal leg was 31.8°C and 32.2°C, which was reduced to 31.7°C and 31.8°C by 0.1°C and 0.4°C respectively. The stomach meridians travel further down the legs, where they reach the ankle; thermographs (Fig. 2) show a hot area around acupoints ST41. These have maximum temperatures of 31.1°C and 31.3°C on right and left lower part of the frontal legs.

Bladder Meridians

The bladder meridians start from acupoints BL1, which originate at the inner extreme points of the eyes, and go straight over the forehead toward the scalp. For subject M10, the maximum temperatures at right and left BL1 before drinking DHW are 36.4°C and 36.5°C, respectively. These drop to 36.1°C and 36.0°C fifteen minutes after drinking DHW. The reductions in maximum temperatures are 0.3°C and 0.5°C respectively. Along the right and left bladder meridian line on the forehead, the maximum temperatures are 36.1°C and 36.1°C, which then fall to 35.5°C and 35.6°C by amounts of 0.6°C and 0.5°C, respectively. The infrared images are shown in Figs. 3A and 3B.

The next place with the different surface temperature on the bladder meridians is at the back of the knees and thighs. This is shown in Fig. 4. The maximum temperatures of the right (Fig. 4A) and left (Fig. 4B) back legs in the region from BL37 to BL40 are measured as 34.6°C and 34.3°C respectively for subject M11. They reduce to 33.7°C and 33.8°C, by an amount of 0.9°C and 0.5°C, fifteen minutes after drinking DHW. For subject M5, the maximum temperatures of the right (Fig. 4C) and left (Fig. 4D) back legs in the region from BL37 to BL40 are 33.8°C and 33.2°C respectively. They fall to 33°C and 32.9°C by an amount of 0.8°C and 0.3°C fifteen minutes after drinking DHW.

Gallbladder Meridian

The thermal images in the subjects with ASD showed many acupoints of the gallbladder meridian, which appear as hot spots on the two sides of the head. We interpret the hot spot next to the eye as GB1, the hot spot next to the center of the ear to be GB2, a the hot spot

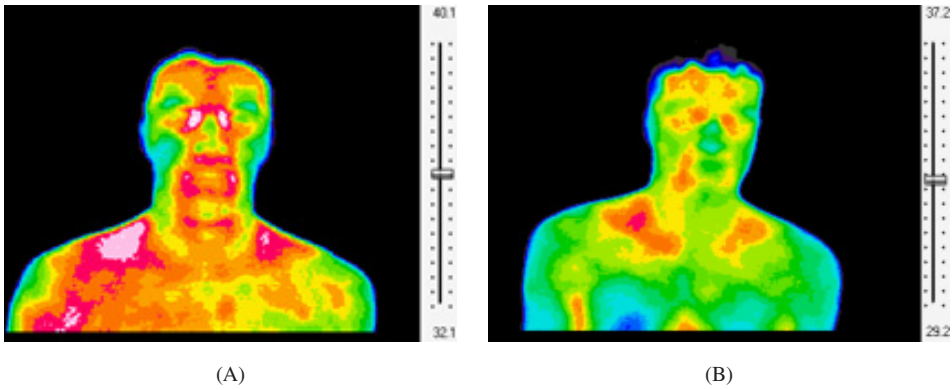


Figure 3. Faces. Subject M8: the left thermograph (A) taken before and right thermograph (B) after drinking DHW.

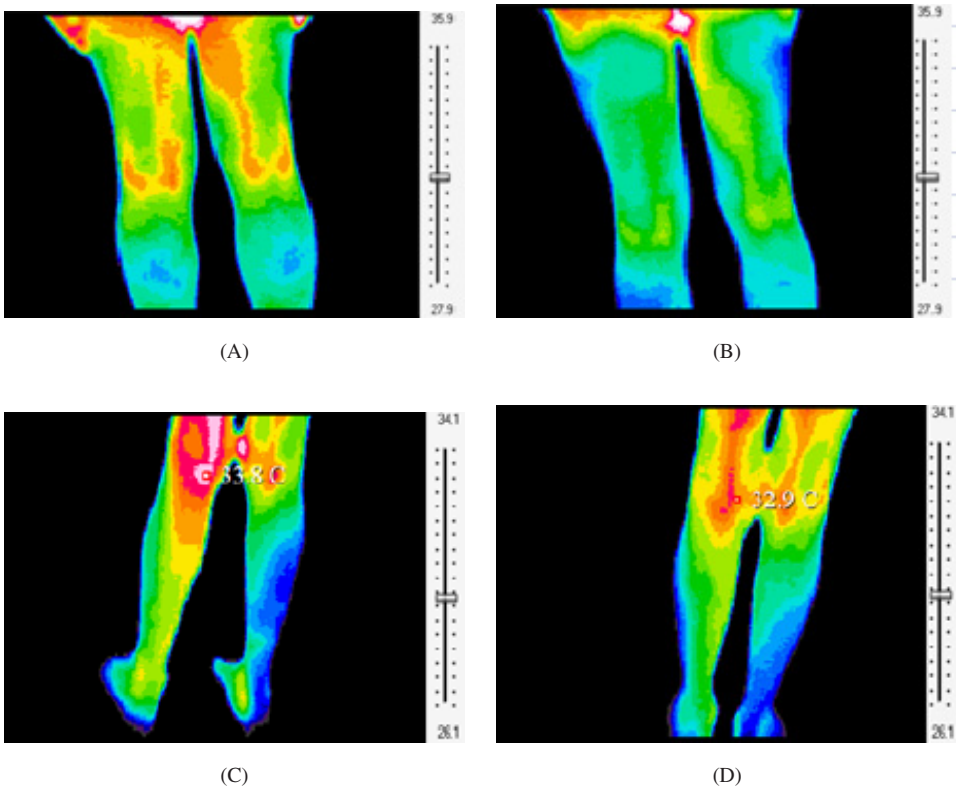


Figure 4. The back legs. The top two thermographic images (A) and (B) are subject M11 before (left) and after (right) drinking DHW; the bottom two images (C) and (D) are subject M5 before (left) and after (right) drinking DHW.

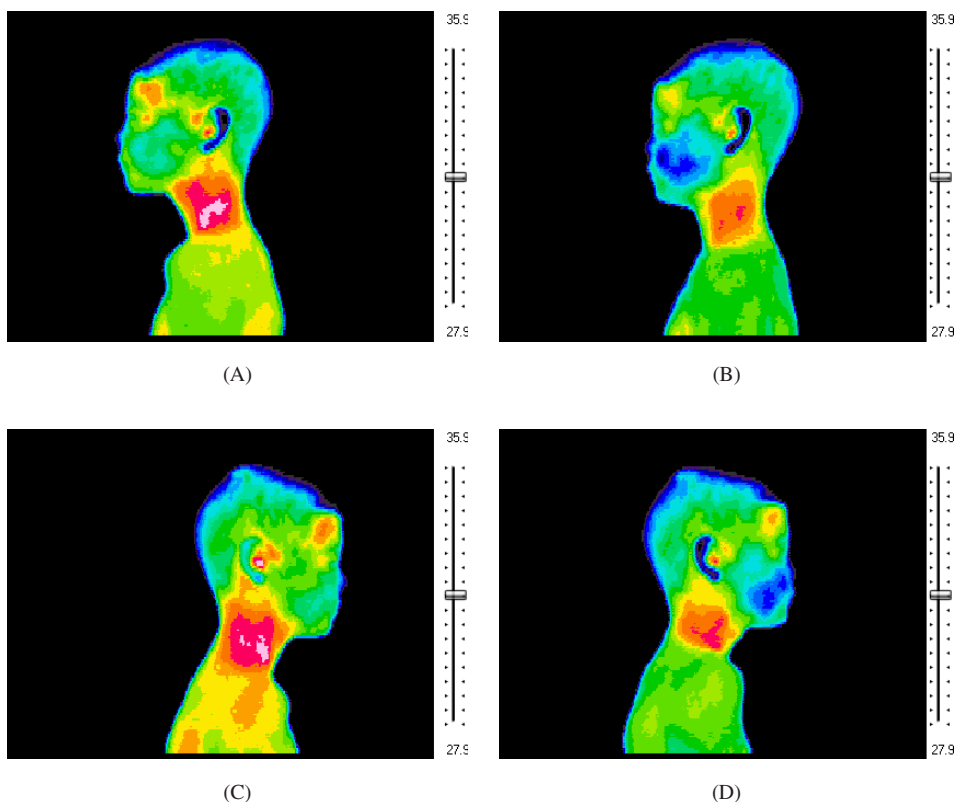


Figure 5. Side of the head, subject M4. The top two thermographs are the left side of the head before ((A) top left), and fifteen minutes after ((B) top right) drinking DHW. The bottom two thermographs are the right side of the head before ((C) bottom left) and fifteen minutes after ((D) bottom right) drinking DHW. GB1 is seen as the acupoint next to the eyes; GB2 is the acupoint next to the front of the ear; GB3 is further from the ear; and GB15 and GB17 are acupoints on the forehead. Branches of the gall bladder meridian are seen around the neck.

further from the ear towards the forehead region to be GB3, and the hot region on the forehead to be GB15 and GB17. The thermographs of the left (Figs. 5A and 5B) and right (Figs. 5C and 5D) side of the head of subject M5 before (left) and after (right) drinking DHW are shown in Fig. 5. The maximum temperatures of GB1, GB2, GB3, and GB15 are 34.2°C, 34.7°C, 34.7°C and 34.6°C, respectively. They drop to 33.7°C, 34.4°C, 34.1°C and 34.0°C, respectively, fifteen minutes after drinking DHW. The reduction of the maximum temperature along these acupoints is 0.5°C, 0.3°C, 0.6°C, and 0.6°C, respectively. The cooling off of the two sides of the head of M5 after drinking DHW is quite noticeable

As the gall bladder meridians travel down from the neck, they pass through the armpit area where acupoints GB22 are situated. Thermal images in the many subjects we have studied with ASD show consistent inflammation in the armpit area. These hot spots may indicate inflammation of the lymphatic nodes, which may come from over activity of the immune system. Alternatively, they may indicate the inflammation of organs along gallbladder meridians. Possibly, these hot spots indicate both. Interpretation of thermographs is non-specific, but

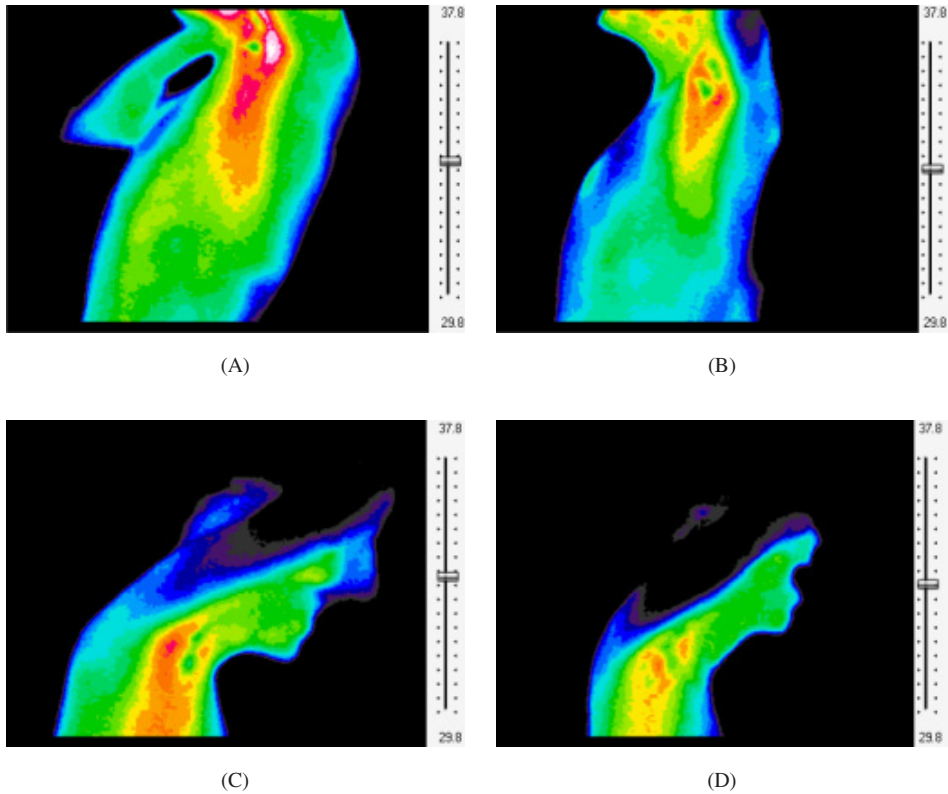


Figure 6. Thermographs of subject M8: Left and right armpits before (upper and lower left) and fifteen minutes after (upper and lower right) drinking DHW. The maximum temperature of the left armpit (upper images) drops from 37.7°C to 36.8°C by an amount of 0.9°C after drinking DHW. The maximum temperature of the right armpit (lower images) drops from 37.0°C to 36.5°C by an amount 0.5°C after drinking DHW.

becomes very useful when it is correlated with the symptoms of the patient. In Fig. 6, the thermographs of the left and right armpits of subject M10 are shown.

SJ Meridian, Large Intestine Meridian, and Small Intestine Meridian

The large intestine meridians start from the bottom side of the nose LI20, and run above the mouth, as shown in Fig. 1A. In Fig. 7, the SJ meridian can be identified on the left side of the neck. It is seen behind the ear and running downward, from SJ17 to SJ16 onwards. The front of the side neck can be interpreted as the small Intestine meridian running between SI16 and SI17.

Thermal Pattern of Autism

In this study, three sets of thermographs were taken for each subject. The first set was taken at the first session, the second set at the second session six weeks later, and the third set at

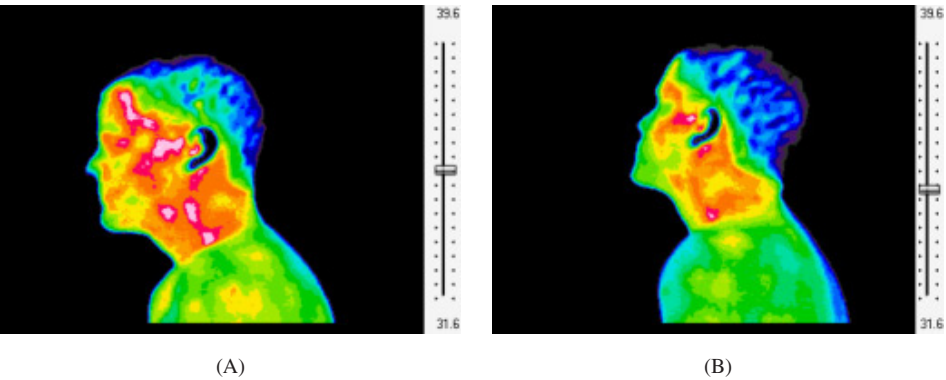


Figure 7. Subject M8. Thermographs of the left side of the head before (A), and fifteen minutes after (B) drinking DHW.

the third session 12 weeks after the first session. When examining the three sets of the-mographs taken at these three sessions, we discovered that there were distinct patterns of hot regions of body surface temperature. These patterns consisted of significant tempera-ture increases as compared to normal areas and at specific regions of the body.

Let us consider only the thermographs taken before drinking DHW, in the first sessions. These patterns show great potential for identifying autism. We have identified three subsets of thermal image patterns, herein termed first order, second order, and third order image patterns. First order patterns occurred in more than 80% of the cases we have studied. Second order patterns occur in more than 50%, but less than 80% of the cases, and third order patterns occur in less than 50% of the cases we have studied. The occurrence fre-quencies of these three orders of patterns are listed in Tables 1, 2, and 3.

Table 1. 1st Order Patterns

Hot Regions	1st Session 1st Week			2nd Session 6th Week			3rd Session 12th Week		
	<i>n1</i>	<i>n2</i>	%	<i>n1</i>	<i>n2</i>	%	<i>n1</i>	<i>n2</i>	%
Front of Ear (Left)	11	11	100	6	9	67	7	8	88
Front of Ear (Right)	11	11	100	10	10	100	7	8	88
Eye Area (Left)	10	10	100	9	9	100	7	8	88
Eye Area (Right)	10	10	100	9	9	100	8	8	100
Side Neck (Left)	11	11	100	11	11	100	9	9	100
Side Neck (Right)	11	11	100	10	10	100	9	9	100
Armpit (Left)	1	1	100	8	9	89	6	8	75
Armpit (Right)	0	0		6	8	75	6	8	75
Side of Forehead (Left)	10	11	91	8	8	100	6	8	75
Side of Forehead (Right)	10	11	91	9	9	100	7	8	88
Collarbone Area (Left)	9	11	82	10	10	100	6	9	67
Collarbone Area (Right)	10	11	91	8	10	80	8	9	89

Note: ($\geq 80\%$), where *n1* is the number of cases with maximum points, *n2* is the number of total cases, and % is *n1/n2*.

Table 2. 2nd Order Patterns

Hot Regions	1st Session 1st Week			2nd Session 6th Week			3rd Session 12th Week		
	<i>n1</i>	<i>n2</i>	%	<i>n1</i>	<i>n2</i>	%	<i>n1</i>	<i>n2</i>	%
Next to Side Face Eye (Left)	6	11	55	5	9	56	1	8	13
2nd Hot Region from the Ear Towards the Direction of Eye (Left)	6	11	55	4	9	44	4	8	50
2nd Hot Region from the Ear Towards the Direction of Eye (Right)	6	11	55	6	10	60	5	8	63
Back of Knee (Left)	4	8	50	1	9	11	1	7	14

Note: ($\geq 50\%$, $< 80\%$), where *n1* is the number of cases with maximum points, *n2* is the number of total cases, and % is $n1/n2$.

Table 3. 3rd Order Patterns

Heat Location	1st Session 1st Week			2nd Session 6th Week			3rd Session 12th Week		
	<i>n1</i>	<i>n2</i>	%	<i>n1</i>	<i>n2</i>	%	<i>n1</i>	<i>n2</i>	%
Next to Side Face Eye (Right)	3	11	27	2	10	20	0	8	0
Mouth (Left)	3	10	30	0	9	0	0	8	0
Mouth (Right)	3	10	30	1	9	11	0	8	0
Back of Knee (Right)	1	8	13	2	9	22	0	7	0
Down Front of Knee (Left)	2	8	25	1	9	11	1	7	14
Down Front of Knee (Right)	2	7	29	0	9	0	2	7	29

Note: ($\geq 50\%$), where *n1* is the number of cases with maximum points, *n2* is the number of total cases, and % is $n1/n2$.

The first order patterns consist of six pairs of hot regions: the head (Figs. 5A and 5C); the left and right eye area (Figs. 1A and 1C); the left and right collarbone region (Figs. 1A and 1C); and finally the left and right armpit region (Fig. 6). The maximum temperature points in these regions may be interpreted by the position of their respective acupoints: GB14, SI19, BL1, ST12, and GB22. The hot areas around the left and right side of the neck are extensive. They may represent the distribution of branch lines of the GB meridian, the SI meridian, and the SJ meridian. We refer to the pattern of heat distribution around meridian lines in these six regions as a first order pattern for ASD.

We see the second order patterns in four hot regions. They are: next to the eye on the left side of the head (Fig. 5A), on the left and right side head in front of the ear (Figs. 5A and 5C), and on the back of the left knee (Fig. 4C). The hottest points in these four hot regions may be interpreted as the acupoints: GB1, GB3, and BL40. The second order patterns in the 11 subjects we studied did not automatically possess left and right

symmetry. When left and right asymmetry occurred, unhealthy conditions existed. There are six thermal image patterns of hot regions representing the third order patterns: next to the eye on the right side of the head, on the left side of the mouth, the right side of the mouth, the back of the right knee, and the left and right region below the front of the knee. The maximum temperatures there may be correlated with the acupoints: GB1, ST4, and ST37. Again, the third order patterns in the 11 subjects we studied did not possess left and right symmetry. Asymmetry generally implied an unhealthy state.

We conclude that first order patterns, with an occurrence of 80%, may serve to identify the presence of ASD. The existence of second and third order patterns demonstrate the individual variations among the different subjects with varying ASD symptoms.

Results

To determine the long-term effect of DHW, over the period of 12 weeks, we used two methods: (1) the average reduction of maximum temperature in each local area of first order patterns as a function of time; and (2) the evaluation forms completed by parents, evaluating their children before and after drinking DHW over the period of twelve weeks.

We first looked at all the thermographs of all subjects taken in the first week, the 6th week, and the 12th week. We located and measured the local maximum temperature of each separate region of the body surface, before and after drinking DHW. We calculated the difference between the maximum temperatures before and after drinking DHW for eleven of the children. We then took the average of the differences in maximum temperatures in each of the six regions identified as first order patterns. They are tabulated in Table 4 and shown in a bar code in Fig. 8. The average temperature differences for each of the six pairs of hot regions for the ASD children clearly rose from the first week through the 6th week, and continued to rise into the 12th week. The total average temperature differences of all six regions for all ASD children increased from 0.55°C in the first week, to 0.85°C in the 6th week, and then to 1.1°C on the 12th week. We interpret these increases over time to be an indication that the DHW has a greater and greater effect on the symptoms of the subjects the longer it is taken. On the contrary, if the DHW had had no effect on autism, the difference in maximum temperature would be zero, and remain so, and not increase over time.

Table 4. 1st Order Patterns

	Forehead Sideviews	Front of Ears	Eye Areas	Neck Sideviews	Collarbone Areas	Armpits	Grand Average
1st Week	-0.51	-0.65	-0.535	-0.5	-0.494	-0.6	-0.55
6th Week	-1.04118	-0.73125	-0.86111	-0.98571	-0.77222	-0.73333	-0.85
12th Week	-1.28462	-0.91429	-0.81111	-0.97778	-1.11429	-1.26667	-1.06

Averages of the differences of maximum temperatures in six regions before and after drinking DHW over all subjects.

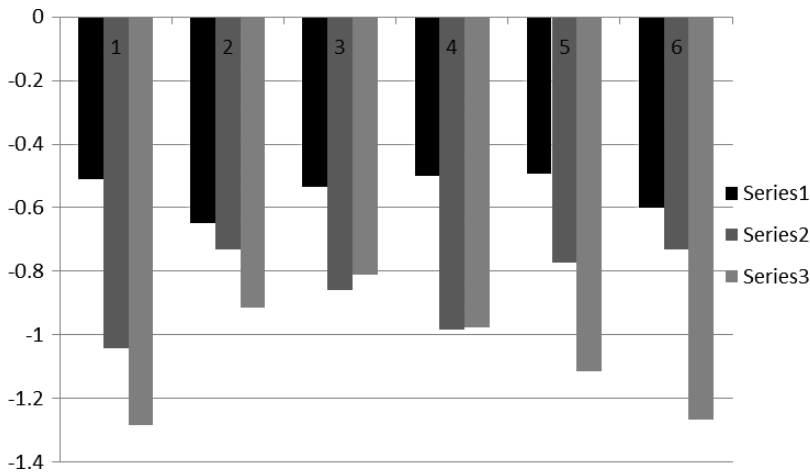


Figure 8. This bar code shows the average of all subjects' reduction of maximum temperature (C^0), measured by thermography, and in the six hot regions that represent first order patterns (see also Table 4). For each region the first, second and third series bar represents the average temperature reduction at the 1st week (black), 6th week (dark gray), and 12th week (light gray). The six regions are from left to right: forehead side-view, next to the front of the ear, the eyes, the sides of the neck, the collarbone, and the armpits.

From the patterns of thermographs of these subjects, one can see the first order signs, (which are defined above as six hot regions: left/right forehead, left/right eye, left/right collarbone area, left/right region near the ear, left/right side neck, and left/right armpit) decrease from 100% from the first week to 12th week. When these first order signs vanish, then we may consider subject as much healthier, free of signs that can be detected by thermographs (Fig. 8).

Secondly, we used the evaluation forms completed by the parents of the autistic children to determine the quantitative improvement of the children. They were asked to evaluate their children and assign a number from 1 to 10 each week based the child's level of problems or of competence that week. On the form, a 1 represented the best condition, and 10 represented the worst. By the end of the 12th week, by comparing the 12 forms from the first week to the end of the study, a quantitative measurement of the improvement of the child could be obtained.

The ten areas of evaluation were:

- (1) Digestive system: eating, appetite, drinking, stomach, etc.
- (2) Bowel movement, urine
- (3) Body movement: repetitive, obsessive, compulsive
- (4) Sleeping and waking
- (5) Communication of needs, following directions
- (6) Language skills
- (7) Non-verbal expressions: eye contact, facial expressions, ticks, posture
- (8) Social skills: interacting with others, peer relationships

(9) Attention span or focus

(10) Ability to attend to academic studies

Let s_j be the score that a parent gives to her child on question j , where question j runs from 1 to 10 as described above. The range of values for s_j is from 1 to 10, 1 being the best condition and 10 being the worst condition. For example $s_9 = 9$ means the child's attention span is very bad. On the other hand $s_2 = 2$ means his bowel movement is very good. Of most interest is the improvement that the child achieves in twelve weeks. So the important quantity is the improvement, Δs :

$$\Delta s_j = s_j(1) - s_j(12), \quad (1)$$

where $s_j(1)$ is the score at week 1, the beginning of the clinical test, and $s_j(12)$ is the score at week 12, the end of the clinical test. Questions 1 through 4 are an evaluation of the physiological state of the child. We denote the average value by

$$\Delta_p = 1/4(\Delta s_1 + \Delta s_2 + \Delta s_3 + \Delta s_4). \quad (2)$$

When Δ_p is positive, it means the physiological state of the child has improved in the twelve-week clinical test period. If Δ_p is negative, it means the physiological state of the child has deteriorated. Questions 5 through 9 are an evaluation of the child's behavior and developmental state. We denote the average behavior and developmental improvement

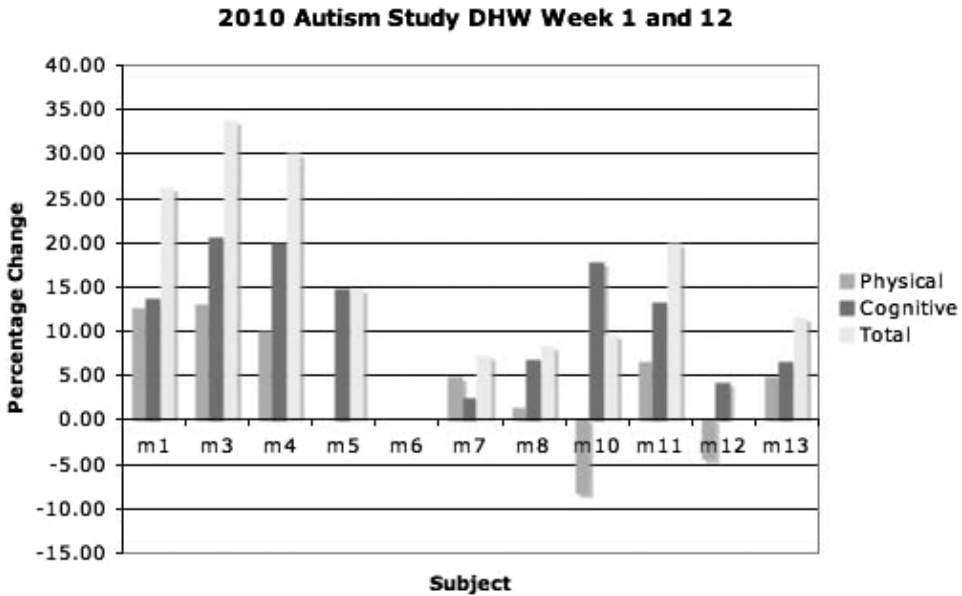


Figure 9. The above bar graph represents the quantitative values of Δ_p and Δ_d of eleven subjects as evaluated by their parents. It is clear that eight out of the 11 subjects showed improvement in their physiological, behavioral and developmental status.

to be

$$\Delta_d = 1/6(\Delta s_5 + \Delta s_6 + \Delta s_7 + \Delta s_8 + \Delta s_9 + \Delta s_{10}). \quad (3)$$

Similarly, when Δ_d is positive, it means that the behavioral and developmental state of the child has improved. Conversely, when Δ_d is negative, it means the behavioral and development state of the child has deteriorated. The results are shown in Fig. 9 as percentage of improvement of each subject's physiological and behavioral state

Discussion

The mechanism of healing by DHW may be explained simply as follows: meridians are hypothesized to consist of DHW (stable water clusters of double helix shape). The malfunction of organs along meridians is explained in Chinese medicine as the blocking of the flow of qi along the meridians. By drinking DHW, the charged water repairs the meridian and unblocks it, so that qi can freely flow again. A blocked meridian is like a river that is blocked by a boulder; the qi cannot flow smoothly. An alternate small river is built around the blockage by DHW, and hence qi can flow smoothly again in this alternate route. Organs along the meridians will then be healed. Inflammation of the organs quiets. Hot regions along meridians become cooler, as observed in the thermographs that were taken.

The hot spots in the eye region, BL1 were white in color and have been found to often be 2°C higher in temperature than the normal healthier regions, which tend to be a green color (Fig. 1). Thus, if one were to interpret the thermographs on face value, one would say that the eyes are inflamed. However none of our ASD children were reported to have eye problems. With the meridian theory, it becomes clear that the hot temperature at BL1 in the corner of the eyes comes from inflammation in organs along the bladder meridian. Meridians act like optical fibers for infrared radiation and transmit the information (of inflammation of the organs along the meridians) to the observable surface point of acupoint BL1. These autistic children generally report that they have either constipation or diarrhea. In other studies of adults we have found that hot spots in BL1 generally indicate a problem with constipation.

The hot spots in the collarbone region are interpreted as ST14. Our study of adult hot spots in the collarbone region indicates that this represents a malfunction of the thyroid. The infrared radiation from the inflammation of thyroid tissue is transmitted by the stomach meridian, and appears in the collarbone region. This would seem to imply that autistic children generally have problems with their thyroid. We therefore suggest that the malfunction of the thyroid be confirmed in future blood tests of autistic children.

The hot area in the armpit is where the GB22 is situated. It may also be interpreted as inflammation of the lymphatic nodes under the arm. The inflammation may be caused by the immune system overworking. This interpretation supports the view that an excessive function of the immune system may be a major component of ASD.

The thermographs reveal a definite heat pattern on the body surface temperature of children with autism. For practitioners that employ acupuncture or qigong to treat ASD, these thermographs provide a definite guidance as to where to put their needles, and where they should unblock the qi channel.

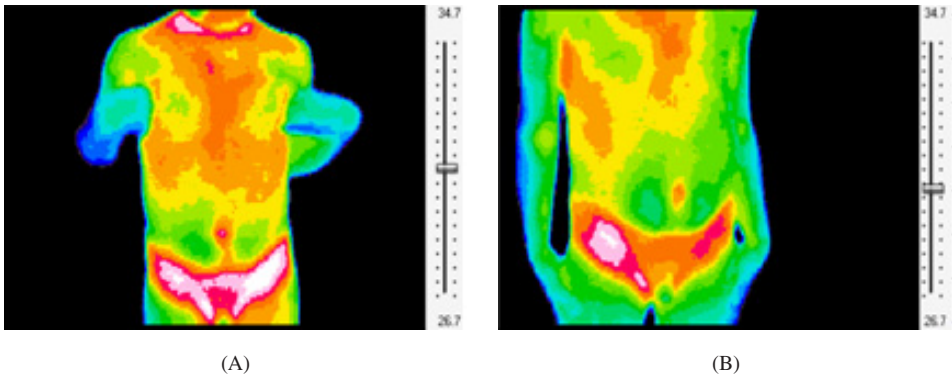


Figure 10. Thermographs of the abdomen of subject M6 before (left) and fifteen minutes after (right) drinking DHW. The maximum temperature before drinking was 34°C which fell to 33.5°C by an amount of 0.5°C.

The thermographs of the abdomen of the subject M6 are shown in Fig. 10. It is clear that this subject has inflammation in the colon and small intestinal areas. Most of our autistic children showed an abnormal temperature distribution of the body surface area in the gastrointestinal and head regions. From the meridian theory point of view, brain disorders and gastrointestinal disorders are connected. Disorders in various parts of the body express as a blockage of qi circulation along the meridian system. Removal of qi blockage along the meridian either by qigong method, acupuncture needles, herbs or DHW will reduce the abnormality in the abdomen and brain simultaneously.

In the discussion of thermal patterns of ASD above, it is quite clear that the pattern does not depend on the meridian theory, although meridian theory provides a rational explanation of the pattern. Hence, if such consistency of first order thermal patterns is demonstrated when more ASD children are studied in the future, then the thermal patterns may be used as a diagnostic tool. Thermographs are inexpensive, non-intrusive, non-touching, passive and harmless. They can be used as a diagnostic tool for much younger children, say at one year old, before observation of any behavioral disorder is possible. It is generally believed that the earlier the healing method is applied to children with ASD, the sooner the health problems can be helped or resolved. With early diagnosis, healing methods such as herbal supplements, qigong massage or DHW can be undertaken much earlier and with greater efficacy curb and to prevent the development of ASD.

Summary

This was a pilot study using thermographs on 11 children with ASD to find if an abnormal thermal pattern on the body surface temperature distribution exists for children with ASD. We discovered a consistent set of thermal patterns that are characteristic of children with ASD. If these patterns were to remain constant for a larger sample of children with ASD, thermographs may be a promising tool to detect ASD, as well as to track the progress of improvement of ASD.

These characteristic thermal patterns, when viewed through the meridian theory, confirm that the meridians connecting the head to the gastrointestinal system (the gallbladder meridian, bladder meridian, stomach meridian, and small intestine meridian) are the most important meridians associated with ASD. The hot spots seen on the thermographs may provide guidance for various methods in Chinese medicine, such as where to insert needles in acupuncture treatment and where to perform qigong treatment. Specifically, we have shown that in every subject, the body's thermal pattern changed within 15 minutes after drinking DHW. There was both qualitative and quantitative evidence from thermographs and from the parents' evaluation that drinking DHW improved the health of eight of out of the 11 subjects.

Acknowledgments

Thanks to Michael Goldberg, MD, for recommending his patients with ASD to undergo this pilot study.

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