Original Article

Examining the Effects of the group intervention using SAT to ameliorate mental distress among Cancer Survivors

Tsunetsugu MUNAKATA[1)], Noriko HIGUCHI[2)], Kazue NAKASHIMA[1)], Kiriko MURAKAMI[1)], Yoko WATANABE[3)], Yutaka YAMAGUCHI[1)], Hiroko IKENO[1)], Yuka IWANAGA[1)], Wen-yan HU[1)], Yoko ICHINOSE[4)], Atsushi NOMOTO[5)],

1) Graduate School of Comprehensive Human Sciences, University of Tsukuba
2) Faculty of Languages and Cultures, Meikai University
3) Teikyo Heisei Nursing Junior College
4) Tsukuba Medical Center Hospital
5) NPO Midorinokaze Health Support Japan

E-mail address: munakata21@yahoo.co.jp

■Abstract

The present study examined the effectiveness of SAT, a “next generation” CBT, to ameliorate mental distress among cancer survivors. CBT has been focusing primarily to change negative thinking patterns first in order to bring about positive behavior. However, SAT as a next generation CBT strives to change negative emotions first to enact positive behavioral actions. Both biometric and psychometric tools were utilized to estimate the effectiveness of the intervention between and within the study groups. Study participants were 17 female cancer survivors (mean age 51 years). Another group of 7 female survivors (mean age, 53 years) were the control. The intervention, which comprised a group lecture regarding the “result of a study on immuno-competence and gene defenses to overcome cancer by SAT therapy” and followed by group approach using SAT, sought to reconstruct the (1) self-image, (2) 3-generation image and (3) ancestral-generation image scripts of the participants from the negative to positive ones in order to decrease their mental distress. The results showed that the SAT therapy was effective: Participants showed decreased cortisol and increased SIgA post-intervention. Post persistence

temperament as stress temperaments were lower than baseline. Also psychological characteristics such as Trait Anxiety (STAI), depression(SDS), self-repression, difficulty in emotion recognition, and self-pity significantly decreased. Between baseline and the 4-month follow-up, those psychological characteristics continued to decrease while problem-solving ability increased. In the non-intervention group, these psychological characteristics did not change pre-post and 4-month later. The facilitatory effects of immune defenses and mental resilience on positive mental health were discussed.

Keyword: cancer survivor, immuno-competence, mental resilience, SAT therapy, mental health

1. Introduction

In Japan the incidence of cancer survivors is high. The statistics rose from approximately 3.65 million at the end of 2004 to about 5 million by 2015 (Yoshimura 2002). These survivors tend to have a high risk of serious mental distress compared to persons without cancer history (Hoffman et al. 2009). It has been pointed out that mental health problems in cancer survivors increase. In Japan and elsewhere, they fear recurrence and metastasis every day (Kuromaru 2009; Aarts et al. 2008). Such fear induces stress that interferes with their self-healing powers. The effects of psychosocial factors on cancer have been studied. These studies report associations between cancer and type C personality type (Temoshok 2003), which is characterized by suppression and denial of emotional expression. Other characteristics of the type C personality include stress-coping failure and resignation tendencies such as hopelessness and helplessness, which may precipitate the onset/progression of cancer (Temoshok 2003). Maeda et al. (2006) reported that the personality traits of gastric cancer patients included self-repression (persons who repress their emotions to obtain a good evaluation from others) and emotion recognition deficit (those who are unlikely to realize their emotions and try to solve problems by themselves, without any help). In other words, they are unlikely to realize and express

their real feelings and emotions and tend to be patient and adamant. Munakata(2007) added that cancer patients might be of the following types: dissociative identity types (who try to consider themselves as another person in order to calm themselves down), problem avoidance types (who have extremely positive thinking and try to handle problems without seeing the actual content of the problems) and the self-pity types (who feel sorry for themselves and work too hard). These persons were unlikely to realize their real feelings and emotions or ask for other's help. Moreover, the patients are likely to be extremely positive because they do not understand the seriousness of the situation.

Some have interpreted that such personalities who cannot express their discomfort but wrestle seriously with daily tasks and accumulate stress may experience tumor immuno-incompetence. Various prospective cohort studies on the causal relationship between a cancer-prone personality and the onset of cancer reported that the onset of cancer might be related to cancer patients' tendency toward depression and tendency to repress their emotions(Shekelle et al. 1981; Persky et al 1987; Bleiker et al. 1996). However, some of these studies reported no definite relationship between them (Hahn et al. 1988; Almada et al. 1991).

Personality consists of "temperament" which core is determined by genes and "self-image script," which is constructed from temperament. The stress-related personality comprises mainly of genetic characteristics, which create susceptibility to stress (or anxiety temperament and persistence temperament). In addition, they are aware of their other-rewarding personality, which is likely to excessively react to the above-mentioned stress caused by their experiences of birth trauma and/or infant trauma and subsequent repetition of such trauma. This becomes the script of their behaviors and establishes their stress-sensitive personality such as the self-repression type, emotion recognition deficit type, and the problem avoidance type.

The stress-sensitive personality is likely to have sympathicotonia, which results in the continuous secretion of adrenaline. As a result, the number of lymphocytes decreases while granulocytes increases. The active oxygen species released from the granulocytes rid the body of foreign bodies. At the same time, they damage

cells, nuclei, and genes, which may cause cancer (Abo 1997). Regardless of whether a person is a self-repression type, emotion recognition deficient types, or problem avoidance type, stress-sensitive personality is formed through “other-reward” seeking behaviors. The behavior is motivated in early childhood to increase reward responsiveness to “pleasure” as seen in the facial expressions, voice tones, and actions of children to avoid aversive expressions of anxiety, anger, and sadness by their parents and guardians. When they grow up, other-reward oriented behavior is motivated and sustained by the responsiveness of significant others in the population instead of parents and guardians.

On the other hand, activities representing own pleasure such as solitary play, play with friends, adventure, art work, sport activity, care of plants, pets and other people in early childhood motivate children to form and indulge in “self-reward” oriented behaviors. A self-reward oriented behavior elicits self-reward satisfaction. Own pleasure, interest, emotion, determination, accomplishment, growth, self-satisfaction, appreciation, and empathy are derived. Failure in self-reward oriented activities do not attract as much mental distress as with the other-reward oriented behaviors.

There are reports that cancer patients tend to possess strong persistence temperament, neglect their feelings and emotions, try to accomplish something by themselves without asking for help, and exhibit other-reward oriented behaviors to obtain good evaluations from others. They tend to have little communication or poor interpersonal relationships with their family members (Munakata 2007; Kobayash et al. 2007)

,. Some psychotherapies based on the hypothesis that stress influences the onset of cancer have been performed on cancer patients in Japan and overseas. An intervention psychological study in patients with breast cancer metastases, which was a randomized controlled study, reported that there was a survival benefit in the psychological intervention group (supportive–self-expression group therapy) (Spiegel 1989). A subsequent study disagreed with the previous study result about life prolongation, but demonstrated that the therapy decreased psychological stress and increased mitigation (Goodwin et al. 2001). There are also reports that the ratio of natural killer (NK) cells of the patients who underwent surgery for malignant melanoma was

greater in the short-term cognitive behavior therapy group than the control group (Fawzy et al. 1990; Goodwin et al. 2001). According to the study by Rehse et al. (2005), meta-analysis of adult cancer patients to evaluate the effects of psychosocial intervention indicated that psychosocial intervention improved their quality of life (QOL). On the other hand, randomized psychosocial intervention studies have reported that such interventions had no effect on the prolongation of survival time (Chow et al. 2004; Boesen & Johansen 2008). A number of studies regarding psychosocial intervention effects have been conducted, but the research is still insufficient.

Cancer survivors are classified into short-term survivors who survive less than 5 years after diagnosis and long-term survivors who survive 5 years or more after diagnosis, which are defined in terms of the outcome of cancer therapies by the medical profession. Recently, the meaning has been changed. “The National Coalition for Cancer Survivorship” in the US has announced a new concept of “cancer survivorship,” which “not only means long-term survival but also means that cancer patients remain cancer survivors from diagnosis to the end of life regardless of the presence or absence of cancer and/or the therapeutic effect” (National Coalition for Cancer Survivorship 1998). Endo (2004) stated that we should create “the significance of living your life” as the necessary support for cancer survivors based on the new concept . We also thought that surgical procedures for cancer did not sufficiently support cancer survivors in the true sense. Therefore, we studied and reported that cancer patients understood that they have had cancer and learned how to live a satisfactory life with cancer, which improved their immune-competence and enhanced the effect of mental resilience improvement on the transition to self-reward oriented behavior (Higuchi & Munakata 2009).

According to our surveys and clinical studies, structured association technique (SAT) therapy encouraged cancer patients by performing self-reward oriented behavior to realize their true feelings and enjoy who they are, communicate with others, and decrease other-reward oriented behavior including the self-repression type and emotion recognition deficit types (Munkata 2007). The therapy also significantly increased immuno-competence (increases of lymphocytes and activation) and the expression of tumor suppressor genes (Munakata 2007; Kobayashi 2007). Furthermore, the first and second authors developed a stress

management system using DVDs and Web content on the basis of SAT therapy in order to improve the mental health and immuno-competence of cancer survivors (Higuchi & Munakata 2009).

This study aimed to understand any changes in cancer survivors, including decreases of stress, changes in lifestyle, improvement of laboratory outcomes, and improvement of their QOL, by a group approach to shift other-reward oriented behavior to self-reward oriented behavior. It was hypothesized that -

(1) SAT would improve trait anxiety and depression level to a greater degree in the intervention group than the non-intervention group (mental health improvement).

(2) The group approach using SAT altered the personality to cause their stress to become chronic due to other-reward oriented behavior including the self-repression type, problem avoidance type, and emotion recognition deficit types greater in the intervention group than the non-intervention group (the facilitatory effect of mental resilience).

(3) The group approach using SAT changed the secretory immunoglobulin A (SIgA) antibody and adrenocortical hormone in saliva in the intervention group (the facilitatory effect of immune defenses).

We will explain how SAT therapy is a new generation cognitive behavior therapy. SAT therapy does not change emotion by changing their way of thinking, which causes mental stress, as in conventional cognitive behavior therapies. The therapy changes emotion first and then changes their way of thinking as a result of the change of emotion. Changing the way of thinking not only improves mental health, but it also changes their stressful emotion in response to physical diseases and/or workaholic tendencies and/or bulimia in the case of the problem avoidance type, dissociative identity type, and emotion recognition deficit types. Therefore, they feel well. Moreover, sympathicotonia lasts and the immune system decreases, which leads to increased granulocytes that release significant active oxygen species.

As described above, according to the theory of SAT therapy, which is a new generation cognitive behavior

therapy, the stress-sensitive personality has stress tendencies and remembers the facial expressions, voice tones, and actions of their parents and guardians, which are associated with their fear and tend to induce stress. Therefore, SAT therapy employs a hypothesis that "we can go back to the past* to change our past and improve our growing conditions," in order to change the images of the facial expressions of their parents and guardians in their memory. Then, the intrinsic expression of the parents and guardians, which is made by unconditional care, is visualized by various imagery techniques of meditation regression, in order to plant a substitute facial expression in their mind by continuously viewing photographs, pictures, religious statues, and bronze statues that look like their parents and guardians. Thus, they are encouraged every day to view the substitute facial expressions portrayed in the photographs, pictures, religious statues, and cartoons instead of their real parents and guardians in order to fix the improved images of their parents and guardians. If it is successful, the substitute facial expression will change their feelings and relax their body.

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*Note 1 Evolution starts from the Big Bang of the universe—elementary particles, nuclei, atoms, molecules, proteins, and organisms evolve into human being as times goes by. The life cycle of a human being starts from their ancestors and parents and continues through their birth and growth. Their self-image should be improved by travelling back to a certain time point in the past through self-image script changing therapy, which is described as follows.

(1) 3-generation imagery therapy – Technique to correct aversive images of the womb interior by using meditation regression imagery of the womb through the three generations to change the image script of their parents and guardians and to change their current self-image script.

(2) Ancestral generation imagery therapy - Technique to promote solving life-threatening risk factors in the past through meditation regression imagery of the womb in order to change the image script of their ancestors & parents and to change their current self-image script.

(3) Evolutional imagery therapy – Threats experienced as a particle and an organism are solved by using meditation regression imagery of the womb in order to change the image script of their parents and to change their current self-image script.

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2. Study method

2.1 Subjects

Intervention group: After a lecture regarding the "result of a study on immuno-competence and gene defenses to overcome cancer by SAT therapy," which was conducted in September 2009 in I prefecture, Japan, the

objectives and overview of a “practical study on group SAT therapy for cancer survivors” (multidisciplinary study of the University of Tsukuba) were explained to the study volunteers. The number of study volunteers was 18, and the number of participants in the first guidance was 12 (all females). Among them, 10 females who participated in the study of 3-generation imagery therapy of SAT therapy using group counseling were selected as subjects, and 7 females who participated in individual continuous intervention were selected as subjects when the intervention for psychological characteristics was studied.

Non-intervention group: Author asked the chairperson of the incorporated nonprofit organization of a cancer survivors club M in I prefecture in Japan to explain the objective and provide an overview of the “practical study on group SAT therapy for cancer survivors” (multidisciplinary project study of University of Tsukuba) and to recruit study volunteers. Of the nine volunteers, seven females who answered three questionnaires were selected as subjects.

The study period was from October 2009 to April 2010.

2.2 Intervention group

(1) 1st intervention: October 2009

Guidance was provided about the intervention using SAT therapy. SAT therapy employs a hypothesis method using a meditation regression imaging method to imagine the evolution of the human being from self → parents and guardians → ancestors → organism → particle and provides images of their past being changed; they are subsequently raised under the improved growing condition. The meditation regression method constructed is based on the body sensations of clients' and is used to create a growing environment with unconditional care, which has not been conveyed from their ancestors, and to urge them to realize the necessary environment and behavior to form the future self-image. The meditation regression imaging method visualizes the facial expressions of parents and guardians who provide unconditional care and finds substitute facial expression including photograph, pictures, religious statue, and bronze statues that look like their

parents and guardians. They are encouraged to continuously view them to frequently stimulate the visual center of the cerebrum and fix the facial expression as well as to change their aversive emotion to a rewarding emotion. In addition, they are encouraged to understand the communality between past unsolved problems and current problems as scripts and realize the behavioral objectives to improve such scripts (large, intermediate, small objectives). The above-mentioned procedures are 3-generation imagery therapy to promote emotion modification, thinking modification, and behavior modification.

(2) 2nd intervention: November 2009

3-generation imagery therapy was performed by group counseling. The therapy is a method used to correct aversive images of the womb interior by meditation regression imaging of the womb through the 3 generations of grandparents, parents/guardians and self to change current self-image script.

(3) 3rd intervention: December 2009 and January-February 2010

The patients participated in at least 2 sessions to undergo the 3-generation imagery therapy and the ancestral-generation imagery therapy. The therapy is a method to promote the resolution of life-threatening risk factors in the past that are imaged by meditation regression imaging of the womb in order to change the image script of their ancestors & parents and to change their current self-image script.

In interventions (1) and (2), the immuno-competent change was measured by using the psychological attributes inventory and a saliva test before and after the intervention by a SAT Health Psychotherapist certified by the Academy for Health Counseling. In (3), the psychological attributes inventory was performed before and after the intervention by a SAT Health Psychotherapist certified by the Academy for Health Counseling.

2.3 Non-intervention group

The questionnaires were sent to the subjects in October and November in 2009 and February 2010 and subjects were asked to perform a self-administered questionnaire.

2.4 Ethical considerations

We explained to the subjects of the intervention group and non-intervention group at the time of the guidance and before starting the study, respectively, that they were not identified in the study and analysis. In addition, they were told that they could participate in this study with free will so that they could decline their cooperation or withdraw from the study at any time and that there would be no effects on their daily life. Finally, we obtained their written informed consent. This study was approved by the epidemiologic research ethics committee of the University of Tsukuba.

2.5 Structure of questionnaire

The questionnaire used in this study consisted of (1) attributes of a subject (age, gender, occupation, composition of family, type of primary cancer, age at diagnosis, medical history of previous cancer treatment, type of cancer at present, and the presence or absence of current treatment and type of treatment if any) and (2) psychological index stress temperaments (persistence temperament, anxiety temperament), and psychological characteristics as measured by the self-esteem scale (Rosenberg, 1965), scale of self-repression (Munakata, 1990), emotional support network scale (Munakata, 1986), scale of problem-solving behavioral trait (Munakata, 1990), interpersonal dependency inventory (McDonald-Scott 1988), scale of state-trait anxiety (Spielberger et al., 1970), elf-rating depression scale (Zung, 1965), scale of difficulty in recognizing emotions (Munakata, 2007), scale of self-pity (Munakata, 2007), scale of the dissociative identity (Munakata, 2007), scale of self-denial (Munakata, 2007), and scale of the post-traumatic

stress syndrome (Munakata, 2007).

2.6 Biochemical index

This study measured SIgA and cortisol (adrenocortical hormone) by using a saliva test. SIgA is found in high concentrations in the saliva, lacrimal fluid, nasal discharge, respiratory tract, mucus, digestive juice, and milk, which is functionally involved in local immunity in the mucosal surfaces. Cortisol is one of glucocorticoids, the essential adrenocortical hormones for the human body, which inhibits carbohydrate, sugar, and protein metabolism. Cortisol is the most abundant in the body among the 3 glucocorticoids and accounts for approximately 95% of glucocorticoid activity; it is released by stress as well. It sometimes increases blood pressure and blood sugar level and decreases the immune function depending on the secretion.

2.7 Analytical method

Each parameter of the psychological characteristics was measured at baseline (after the guidance), at the time of completion of the 3-generation imagery therapy, and at the time of the ancestral-generation imagery therapy. The changes between these time points were statistically analyzed using statistical software SPSS17.0J for Windows. The Wilcoxon signed-ranks test was used to compare immuno-competence before and after the intervention.

3. Results

3.1 Intervention group

The subjects who underwent the group therapy using the 3-generation imagery therapy were 10 females with a mean age of 50.90±11.27 years. In terms of the stress temperaments, their persistence temperament was 3.30 (1.49), which was moderate, and their anxiety temperament was 3.80 (1.40), which was moderate. Their

cancers were breast cancer (7 subjects), ovarian cancer (1 subject), thyroid cancer (1 subject), and leiomyosarcoma of the left popliteal fossa (1 subject). The subjects who subsequently received the individual intervention were 7 subjects with a mean age of 52.57 (SD±11.370) years. In terms of their stress temperaments, their persistence temperament was 3.57 (SD±1.27), which was moderate, and their anxiety temperament was 4.14 (SD±1.22), which was also moderate. Their cancers were breast cancer (5 subjects), thyroid cancer (1 subject), and leiomyosarcoma of the left popliteal fossa (1 subject).

3.2 Non-intervention group

The subjects in the non-intervention group were 7 females with mean age of 53.00 (SD±7.84) years old. With respect to stress temperaments, their persistence temperament was 3.86 (SD±1.22), which was moderate, and their anxiety temperament was 3.00 (SD±1.73), which was also moderate. Their cancers were breast cancer (3 subjects), uterine cancer (1 subject), gastric cancer (1 subject), renal cancer (1 subject), and colon cancer (1 subject).

3.3 Changes by the intervention

(1) Changes of the biochemical index

Changes of the biochemical index before and after the group therapy intervention using the 3-generation imagery therapy. The adrenocortical hormone levels in the saliva tended to decrease from before and after the intervention (Wilcoxon signed-ranks test, z = -1.82, p = .069). The SIgA levels in the saliva immediately after the intervention were significantly greater than those before the intervention (Wilcoxon signed-ranks test, z = -1.99, p = .047).

(2) Changes of psychological characteristics

According to the comparison of psychological characteristics between at baseline and at the completion of the 3-generation imagery therapy, the scale of self-repression significantly decreased (Wilcoxon signed-ranks test,

z = -2.21, p = .027); the scale of difficulty in emotion recognition significantly decreased (Wilcoxon signed-ranks test, z = -1.89, p = .058); the scale of self-pity significantly decreased (Wilcoxon signed-ranks test, z = -2.03, p = .042); and PTSS significantly decreased (Wilcoxon signed-ranks test, z = -2.03, p = .042).

The comparison between at baseline and 4 months later when the intervention of the 3-generation and ancestral-generation imagery therapy were completed demonstrated that the scale of self-repression (Wilcoxon signed-ranks test, z = -2.20, p = .028), the scale of difficulty in emotion recognition (Wilcoxon signed-ranks test, z = -2.21, p = .027), the scale of self-pity (Wilcoxon signed-ranks test, z = -2.12, p = .034), the scale of dissociative identity (Wilcoxon signed-ranks test, z = -2.23, p = .026), and PTSS (Wilcoxon signed-ranks test, z = -2.03, p = .042) significantly decreased, and that the scale of problem-solving (Wilcoxon signed-ranks test, z = -2.22, p = .027) significantly increased.

In the non-intervention group, the scale of self-repression (Friedman test, χ^2 = .75, p = .687, the scale of difficulty in emotion recognition (Friedman test, χ^2 = .64, p = .727), the scale of self-pity (Friedman test, χ^2 = 1.06, p = .589), the scale of dissociative identity (Friedman test, χ^2 = 0.00, p = 1.0), and PTSS (Friedman test, χ^2 = 3.55, p = .170) did not change between at baseline and 1 month and 4 months later. On the other hand, there were changes between at baseline and 1 month and 4 months later in the scale of problem-solving and the interpersonal dependency inventory (Friedman test, χ^2 = 6.77, p = .035; χ^2 = 7.58, p = .023, respectively). The comparison of the scale of problem-solving between at baseline and 1 month later showed it tended to significantly decrease (Wilcoxon signed-ranks test, z = -2.03, p = .042), while there were no significant differences in the scale of problem-solving between at baseline and 4 months later (Wilcoxon signed-ranks tests, z = -1.52, p = .129). There were no significant differences in the interpersonal dependency inventory between at baseline and 1 month later (Wilcoxon signed-ranks test, z = -1.51, p =. 131), while the interpersonal dependency inventory significantly decreased between at baseline and 4 months later (Wilcoxon signed-ranks test, z = -2.27, P = .023).

In the group that received continuous intervention by SAT therapy, self-repression, difficulty in emotion recognition, self-pity, dissociative identity, and problem-solving, which are likely to induce chronic stress, were improved, and PTSS decreased. In the non-intervention group, the scale of problem-solving tended to decrease or remained low, and the interpersonal dependency inventory decreased 4 months later.

In addition, trait anxiety and depression in the intervention group between at baseline and after completion of all of the interventions were compared by using the Wilcoxon signed-ranks test.

The median score of trait anxiety in the intervention group at baseline was high at 55.0, which indicated that they were always anxious. The score after completion of 3-generation imagery therapy was 28.0 (Wilcoxon signed-ranks test, z = -2.20, p = .028) and that after the ancestral-generation imagery therapy was 27.0 (Wilcoxon signed-ranks test, z = -2.20, p = .028), which was significantly lower than that at baseline and showed a decrease of their anxious tendencies.

The median score of depression in the intervention group at baseline was 47.0, which showed their tendencies of slight depression. The score after completion of the 3-generation imagery therapy was 25.0 (Wilcoxon signed-ranks test, z = -2.20, p = .028) and significantly decreased. The score after completion of the ancestral-generation imagery therapy was 26.0 (Wilcoxon signed-ranks test, z = -1.86, p = .063), which showed a tendency to be significantly lower than that at baseline. On the other hand, there were no significant changes in the scores of trait anxiety and depression in the non-intervention group (Friedman test, χ^2 =.07, p =.964; χ^2 = 0.26, p = .878, respectively)

Table 1 Biochemical index

	SIgA				Cortisol	
	self-image script		3-generation image script		3-generation image script	
	Before	After	Before	After	Before	After
Median	325.95	385.55	148.85	317.60	.26	.16
Interquartile range	203.58	307.80	117.75	264.45	.29	.07

Table 2 Psychological characteristics

< Intervention group >

	Self-esteem			Self-repression		
	Baseline	2-3months after 3-generation	3-4 months after Ancestral-generation	Baseline	2-3months after 3-generation	3-4 months after Ancestral-generation
Median	7.00	10.00	9.00	11.00	6.00	4.00
Interquartile range	5.00	2.00	1.00	7.00	6.00	6.00

	Recognition of emotional support network (by family members)			Recognition of emotional support network (by people other than family members)		
	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation
Median	10.00	10.00	10.00	6.00	8.00	8.00
Interquartile range	5.00	1.00	2.00	4.00	4.00	4.00
	Problem-solving			Interpersonal dependency		
	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation
Median	11.00	10.00	17.00	9.00	4.00	4.00
Interquartile range	5.00	13.00	6.00	7.00	3.00	2.00

	Trait anxiety			Depression		
	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation
Median	55.00	28.00	27.00	47.00	25.00	26.00
Interquartile range	18.00	16.00	15.00	16.00	11.00	14.00

	Required level of health counseling			Difficulty in emotion recognition		
	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation
Median	8.00	1.00	2.00	11.00	4.00	5.00
Interquartile range	9.00	4.00	3.00	7.00	6.00	6.00

	Self-pity			Dissociative identity		
	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation
Median	6.00	3.00	1.00	3.00	1.00	1.00
Interquartile range	8.00	6.00	3.00	5.00	3.00	2.00

	Self-denial			PTSS		
	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation	Baseline	2-3 months after 3-generation	3-4 months after Ancestral-generation
Median	2.00	.00	.00	4.00	.00	.00
Interquartile range	2.00	1.00	.00	3.00	2.00	3.00

< Non-intervention group >

	Self-repression			Problem-solving		
	Baseline	1 month later	4 months later	Baseline	1 month later	4 months later
Median	5.00	5.00	7.00	11.00	10.00	11.00
Interquartile range	11.00	4.00	4.00	4.00	6.00	2.00

	Interpersonal dependency inventory			Trait anxiety		
	Baseline	1 month later	4 months later	Baseline	1 month later	4 months later
Median	4.00	4.00	3.00	39.00	38.00	41.00
Interquartile range	2.00	1.00	1.00	8.00	12.00	21.00

	Depression			Difficulty in emotion recognition		
	Baseline	1 month later	4 months later	Baseline	1 month later	4 months later
Median	32.00	32.00	33.00	5.00	5.00	4.00
Interquartile range	5.00	5.00	14.00	2.00	4.00	7.00

	Self-pity			Dissociative identity		
	Baseline	1 month later	4 months later	Baseline	1 month later	4 months later
Median	7.00	7.00	6.00	2.00	3.00	3.00
Interquartile range	5.00	3.00	4.00	3.00	4.00	2.00

	PTSS		
	Baseline	1 month later	4 months later
Median	1.00	2.00	2.00
Interquartile range	1.00	2.00	5.00

4. Discussion

4.1 Facilitatory effect of immune defenses

Changes in the biochemical index of the psychosocial intervention group and the non-intervention group were studied. The result indicated that the adrenocortical hormone levels in the saliva tended to decrease ($p < .07$)while the SIgA levels in the saliva significantly increased in the intervention group, which was the same as the result of significant increase($p < .05$) of the SIgA level in the saliva before and after SAT intervention described in our previous DVD study. The SIgA level in the saliva represents mental and physical stress and decreases by the stress load on the body or negative feelings (Labott 1990). The SIgA level in the saliva receives attention as the index to reflect moderate stress, but there are only a few reports on the relationship between the SIgA level in the saliva and stress; future evidence accumulation is expected. However, the SIgA levels in the saliva increased immediately after the start of this study, which suggested the stress relief effect by the psychosocial intervention.

Van der Pompe et al. (1997) performed a 13-week psychosocial intervention for breast cancer patients and reported the blood concentration of adrenocortical hormone decreased. Our 1-day intervention result also indicated that the adrenocortical hormone levels in the saliva decreased. It has been reported that the free cortisol in the blood transfers into the saliva depending on the blood concentration, and that the adrenocortical hormone levels in the saliva increase especially in response to mental and physical acute stress. This study result indicated that the adrenocortical hormone levels in the saliva decreased as the SIgA level increased and confirmed that the intervention had a stress relief effect and relaxation effect.

This intervention does not aim to provide a relaxation effect but aims to change behavior to self-reward pursuit behavior, which does not accumulate stress. Therefore, a measurement to evaluate the long-term effect is needed.

4.2 Facilitatory effect of stress resilience

Resilience is defined as the “absolutely essential psychological characteristics to stand and overcome adversity and to maintain sound mental activity emotionally, cognitively, and socially” (Mori et al., 2002) and the “universal capacity which allows a person, group or community to prevent, minimize or overcome the damaging effects of adversity” (Grotberg EH, 2003). People with high resilience can rapidly and easily escape from undesirable events and recover from psychological impacts. In addition to the above-mentioned profile, the roles of resilience in daily living have been studied (Oshio, 2002).The concept of resilience varies depending on the researchers. In fact, there are various points of view. We consider resilience as “self-reward oriented behavior that persons use to realize their real feelings, enjoy themselves, live positively, and communicate with family members and others and seek self-satisfaction, as opposed to a behavior of working hard to win rewards from others.” Resilience supports them to increase their self-rewarding behavior.

No improved changes except for the interpersonal dependency were observed in the non-intervention group, while there were significant changes in the intervention group that continued the intervention using SAT therapy, including changes in the self-repression scale, scale of emotion recognition deficit, scale of self-pity, scale of the dissociative identity, scale of problem-solving and post-traumatic stress syndrome. These findings indicated that their mental resilience was improved, that is, they could honestly express themselves, ask for support if necessary without worrying alone, and face problems with self-absorbing thought if needed.

There is a conventional intervention, Simonton therapy, which was developed by Carl Simonton (1978), and it helps patients visualize their immune cells destroying the cancer cells. Simonton clarified that there was a relationship between the optimism level of cancer patients and resistance against cancer. In addition, there were similar reports on the relief of depression and the case of a terminally ill cancer patient who recovered from carcinomatous myelopathy using combined therapy of Simonton therapy and biofeedback, which demonstrated that patients could reestablish their “identity” and control their disease by themselves by imaging

that lymphocytes destroyed the cancer cells. Our group intervention program also uses many images in the process to approach to potential stress, which turns to symptoms and signs in the process to resolve problems. As the 5-year- study by SAT individual therapy of Munakata & Kobayashi (2007) demonstrated, continuous changes of the images may have a big effect on the autonomic nervous system, endocrine system, and immune system in all imageries by group intervention using SAT. .

This intervention program was different from conventional psychosocial interventions including cognitive behavior therapy. The conventional interventions consciously removed cognitive distortions at the beginning to accelerate the modification of emotion expression and behavior modification, while this intervention naturally corrected cognitive distortions using modification of emotion expression. In more detail, this intervention method employed the method of re-scripting facial expression, which “improves the internal representation of parents and guardians” at the beginning to give a sense of security. Such sense of security improved the modification of emotion and enabled the subjects to change their self-cognition. As also seen in the descriptive data on changes and opinions of the psychological index, the transcripts during the intervention process revealed the patients’ emotion and thinking were changed to “I can be myself” and “I can tell them my honest feelings” after the completion of the improvement of images of their parents and guardians. Thus, this intervention clarified the process of their behavior modification, such as “I can frankly express my feelings,” and also might prolong the facilitatory effect of stress resilience by the effective reconstruction of a positive self-image script. Cognition and behavior are decided by their self-image from information based on their experiences and memories. Therefore, if they try to modify their behavior by changing their cognition without changing their past self-image, they will not be able to change anything about their lifestyle. This intervention program visualizes their “authentic being” when they are protected without any conditions and live their own lives. Then, they compare the “authentic being” with the “actual self” and realize the difference, which will enable them to live their lives according to self-reward pursuit model. The biggest factor towards accomplishing the above-mentioned goal might be the complete removal of their past aversive memory and the image work to reconstruct their authentic self during this intervention, which might contribute to the

prolongation of the survival period of cancer survivors.

4.3 Mental health improvement

There were no significant changes in trait anxiety and depression level in the non-intervention group, but they were remarkably improved in the intervention group. The modification of their self-image and behavior to a self-reward pursuit type with high resilience resulted in increase in their positive self-image and decrease in their anxiety, impatience, and depression. They found their future hope and improved their mental health.

The conventional psychosocial interventions for cancer survivors include educational intervention, psychological support, relaxation methods, and cognitive behavior therapies to alleviate anxiety, and these various methods have been studied. Edward et al. (2008) performed a meta-analysis of psychotherapy in breast cancer patients and reported that two cognitive behavior therapies and three types of supportive—existential psychotherapy provided some psychological effects. However, the effects lasted only for a few months and did not prolong their survival period. The supportive—existential psychotherapy is a type of group intervention performed according to a manual with six goals, including the development of a supportive environment, relief of sadness, reconstruction of negative thoughts, improvement of coping skill and problem solving abilities, and encouragement of having a hope. As described above, the psychological intervention used in this study is an original method to achieve self-reward behavior.

Unlike this group intervention using SAT therapy, these interventions need a certain period and frequency and have neither intensive effects nor short-term effects. Cancer patients and cancer survivors fear to express “myself as I am” and accumulate malignant stress because they try to adjust themselves to society first. SAT therapy is a new cognitive behavior therapy to resolve their past unsolved problems caused by codependent attachment, which has been previously learned to survive in the other-rewarding society. The conventional cognitive behavior therapies focus on cognitive distortions, which prioritize removal of their cognitive

distortions and uncomfortable feelings in order for them to think and judge according to their current situations. In order to break out of the cycle of “thinking–emotion–behavior–further thinking,” their extreme pessimistic thinking and depression should be removed. Therefore, these therapies encourage the patients to write out the actual situations in which they experience the anxiety, feelings, and behavior as well as their functional alternative thinking and behavior at that time in order to reconstruct their cognition. Thus, these therapies change the “thinking habit” of malignant stress to adaptive thinking. Despite the modification in thinking and achieving short-term effects, stress will later turn to somatization disorders if those are only theoretical. Therefore, it is essential not only to modify thoughts but also to modify cognition and behavior directly from changes of emotion. This group intervention using SAT therapy will be effective as a new cognitive behavior therapy based on such standpoint.

This intervention is also characterized by a group intervention by a support group. The intervention proposed by Spiegel et al. (1989) as described above was performed in a free talking style to discuss their distress and problems between a few patients as well as a psychiatrist and social workers. Psycho-oncology in Japan has been performed as a “medical intervention” in the medical field according to the diagnosis of an “adjustment disorder” by a doctor and performed to “share their feelings” in the support group in the nursing field. In their study on the use of psychosocial intervention in form of a supportive group to address the problem of cancer with companions, Fawzy et al. (1990) reported that the five-year mortality in the intervention group was one third of that in the control group. The previous studies have reported that mutual support and the establishment of identity are essential in order to overcome cancer. This group intervention using SAT therapy also supports the modification of their life that they live together with others, so that cancer survivors can realize who they are and awaken themselves. Furthermore, cancer survivors who undergo this intervention “share their feelings and understand others” in the same support group and nurture themselves as in the self-reward pursuit type using their empathy and empowerment, which may enable them to achieve the goal even if the intervention period is short.

This study demonstrated the usefulness of SAT therapy in cancer survivors by showing that they could change their behavior to self-reward pursuit behavior and improve resilience and mental health. In the future, practical support using SAT therapy should be performed on a large scale in cancer patient associations and support groups.

4.4 Limitations and future tasks

This study aimed to evaluate the short to moderate term effectiveness of this intervention, but did not evaluate whether immuno-competence and the facilitatory effect of resilience endure or not. The survival benefit and survival rate by this intervention shall for the basis for future research.

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