

**ORIGINAL****An attempt to analyze the longitudinal psychological state of cancer patients in the active treatment stage**Chise Ueoka<sup>1,2</sup>, Masahito Nakataki<sup>1</sup>, Yoshinori Ueoka<sup>3</sup>, Atsuko Miyazaki<sup>4</sup>, Saki Taniguchi<sup>4</sup>, and Tetsuro Ohmori<sup>1</sup><sup>1</sup>Department of Psychiatry, Graduate School of Biomedical Sciences, Tokushima University, Tokushima, Japan, <sup>2</sup>Department of Human Life Science, Faculty of Human Life Science, Shikoku University, Tokushima Japan, <sup>3</sup>Department Early Childhood Care and Education, Shikoku University, Junior College, Tokushima, Japan, <sup>4</sup>Cancer management Center, Tokushima University Hospital (Tokushima, Japan)

**Abstract :** The psychological state and changes over time of cancer patients in the active treatment stage were classified into emotions by the speech and behavior of the patient described in the medical record article of the cancer psychological interview record, and the analysis of the “emotional state map” was attempted. In all cases, positive/negative emotions were mixed and appeared with variation, but a relatively large number of positive emotions, including <joy>, <relief>, and <liking>, were manifested, and the same was true in patients who experienced stressful treatment events. In the background, the existence of appropriate support from medical professionals and psychological characteristics peculiar to the stage of active treatment was inferred, such as the active treatment of the target patient, the hospitalization environment in which mental and physical pain promptly appealed to medical professionals, and the influence of psychological interviews. Cancer patients during active treatment perceived and expressed changes in the body and pain caused by the disease, and after responses from medical professionals and family members, they were conscious of their physical condition and emotions. It is suggested that this analysis method helps to objectively understand and explain the invisible and ever-changing psychological state of cancer patients in the active treatment stage. *J. Med. Invest.* 68: 148-153, February, 2021

**Keywords :** cancer patients in the active treatment stage, psychological interview records, positive/negative emotions, emotional state map

**INTRODUCTION**

Cancer patients in the active treatment stage, starting with the notification of their diagnosis, have to decide whether to undergo surgery or other treatments for a short period of time and are often exposed to clinical events before they are emotionally prepared (1). After they are notified of their cancer diagnosis, patients frequently experience mental symptoms in all stages of disease (2, 3). Considering the difference in psychological state between active treatment and terminal care, psychological symptoms need to be carefully examined (4) to establish a good relationship with patients based on their psychological state (5). Previous case studies focused on the psychology of cancer patients examined through a case study (6, 7), psychological tests (8, 9), interviews (10) and literature surveys (11-13), most of which targeted terminally ill patients (14-18). Conversely, previous studies on the psychological state of cancer patients during active treatment in Europe and the United States have examined changes after diagnosis and initial treatment (19-21), surgical decision-making (22), the relationship between positive emotions and depression (23, 24), and fear of hematopoietic stem cell transplantation (25). In Japan, studies on the psychological responses related to early-stage lung cancer (26) and outpatient chemotherapy (13, 27, 28) were examined, all of which were involved the use of questionnaires or one-off interviews.

The clinical setting of the psychological care of cancer patients at our hospital specializes in active treatment. Here, we often saw patients who fluctuated psychologically and emotionally ac-

ording to their treatment and medical condition. It is essential to understand the patients’ speech and behavior in context and to carefully observe how the psychological state changes over time. Some ingenuity is also required to express the patients’ mental state to other medical staff during their consultations. However, previous studies on cancer patients were mostly cross-sectional and were insufficient to understand the psychological and emotional state of cancer patients during active treatment who experience changes in the treatment environment in a short period of time. In addition, there is little research on how to objectively express the changing psychological state of patients. Changes in the psychological state experienced by cancer patients could be understood by a method that analyzes the entire treatment process, not a one-off assessment.

In this study, we extracted the behavior of seven patients who were informed of their cancer diagnosis and were actively treated and cared for by a palliative care team. Their speech and behaviors were extracted and classified according to the “type of emotions”. Further, quantifying the types of emotion, we tried to create an “emotional state map” that can help to visually see the psychological changes of cancer patients during treatment process over time. The purpose of this study was to examine a new method of analysis that can promote objective understanding of the changes in the psychological and emotional states of cancer patients in the active treatment stage.

In this study, “cancer patients in the active treatment stage” refer to patients who are admitted to and treated in an acute care hospital undergoing surgery, chemotherapy, radiotherapy, and bone marrow transplantation, including diagnosis and notification.

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## METHODS

### Subjects of the study

We screened 183 cancer patients aged 20 years or older who had been admitted to Tokushima University Hospital between 2007 and 2010 and had chosen aggressive treatment after being informed of their disease. They were interviewed by a clinical psychologist. Patients with intellectual disabilities and those who had continued therapy were excluded. As a result, seven cases were analyzed. They were all male. The cancer types were as follows: case 1, lung cancer; case 2, malignant lymphoma; case 3, pancreatic cancer; case 4, pre-diaphragm tumor; case 5, gastric cancer; case 6, acute myeloid leukemia; and case 7, esophageal cancer. Regarding the ages, the patient in case 6 was in his 40s, the patients in cases 2 and 4 were in their 50s, the patient in case 3 was in his 60s, and the patients in cases 1, 5, and 7 were in their 70s. None of the patients had a particular religion. The method of psychological support was based on a non-direct approach, which emphasized empathic listening rather than structural psychotherapy.

This study was conducted with the approval of the Tokushima University School of Medicine Ethics Review Committee, based on the Declaration of Helsinki. Opt-out consent was obtained.

### Analysis of interview records

Psychological interview records were extracted from the electronic medical records and used for analysis. Analyzed records included the period of hospitalization, after discharge, and rehospitalization. Psychological interview records consist of the speech and behavior of the patients, the speech and behavior of

the family or attendants, information upon consultation with the medical staff, and psychologists' assessment. Of these, only the speech and behavior of the patients were selected and analyzed.

### Creation of emotional classification tables by emotion type and emotion category

Analysis of the records of the patients' speech and behavior was based on a qualitative study, and similar studies (27, 29, 30). Firstly, three psychologists conducted open coding to classify the patient's speech and behavior with mutual consultation using two patients with abundant descriptions of speech and behavior in their clinical records. Then, the other patient's speech and behavior are analyzed and conceptualized with an emphasis on changes and contexts over time.

We defined the words expressing emotions in Japanese as <types of emotion> and the emotions constituting each type of emotion as [categories of emotion], based on the emotions and notations classified in Nakamura's "emotional expression dictionary" (31). The [categories of emotion] in this study refer to emotional words that provide clues for classifying a patient's behavior into <types of emotion>. In addition, if the patients' speech and behavior could not be classified into [categories of emotion], they were classified into <types of emotion> by referring to another version of [categories of emotion], which were compiled by Hama (32) referring to the hierarchical cluster analysis of emotions by Fischer *et al.* (33). The types of emotion were composed of a total of 10 types. 10 types of emotion, categories of emotion that comprise each type of emotion as well as the total number of categories of emotion, and examples of speech and behavior corresponding to each category are presented in Table 1.

Table 1. The type of emotion according to the emotional classification table.

Emotional type	Emotional categories	Examples of speech and behavior of patients
joy	thanks hope Others, total 8 categories	I was so selfish, thanks to my doctor and staffs. I felt better than ever.
anger	moodiness angriness Others, total 25 categories	Sighing grimly. Biting his lips, shaking the legs, sighed, expressed frustration at the whole body.
sorrow	empty feeling Sadness, disappointment Others, total 37 categories	I have no energy at all. Last night, I couldn't sleep because of the noisy IV syringe pump.
fear	worry anxious Others, total 17 categories	My physical strength is not enough, I am worried about liver function. My family won't come, and I won't be long anymore.
shame	blush, shame ashamed, guilt Others, total 37 categories	He was wry smile and said <I had to come back in just one day>. I'm sorry. I could not help but get angry.
liking	love, care longing, request Others, total 15 categories	I'm concerned about my wife. I want to be able to sleep until morning, I want to walk.
dislike	disagreeable melancholy Others, total 24 categories	I hate being here (clean room). I'm feeling down.
excitement	get irritated feel impatient Others, total 17 categories	I can't even open the window shade by myself. I didn't sleep well yesterday either.
relief	peace of mind calm, easy mind Others, total 28 categories	Much better than yesterday. The nurse took me outside for a change of pace, so I didn't get frustrated.
surprise	surprise, be confused unexpected Others, total 5 categories	When I try to grab a cup, I often see dreams that disappear like illusions. It is unbelievable that I was too tired to do anything 2 weeks ago.

The types of emotion and categories were created based on Nakamura (1993) and Hama *et al.* (2010). The types of emotion, categories of emotion that comprise each type of emotion, and examples of speech and behavior corresponding to each category are presented in Table 1.

Quantification of types of emotion over the course of treatment events

Clinical events experienced by patients during treatment were extracted from clinical records. These events consist of informed consent, chemotherapy, radiation therapy, opioid use, diagnosis, operation, recurrence, and remission. All clinical events and types of emotion were sorted in order of time, and the date of diagnosis was set to 0. To visualize the psychological and emotional states that change in the course of treatment, we tried to create a map of clinical events and types of emotion for each case (Fig. 1). The black bar represents the period of hospitalization, chemotherapy, radiation therapy, or opioid use, respectively. The “clinical record” row in the middle of the map represents the psychological interview carried out. One clinical record is marked as a cross. The bottom half of the map represents the occurrence of the types of emotion. The size of each plot indicates the frequency of the emotion that occurred in that psychological interview record. The types of emotion were ordered as positive emotions <relief/joy/liking>, negative emotions <dislike/sorrow/fear/anger>, and other emotions <shame/surprise/excitement> and plotted using black circles, black triangles, and gray circles, respectively. The lowest part of the map represents the frequency of positive, negative, and other emotions with gradient grayscale. The more

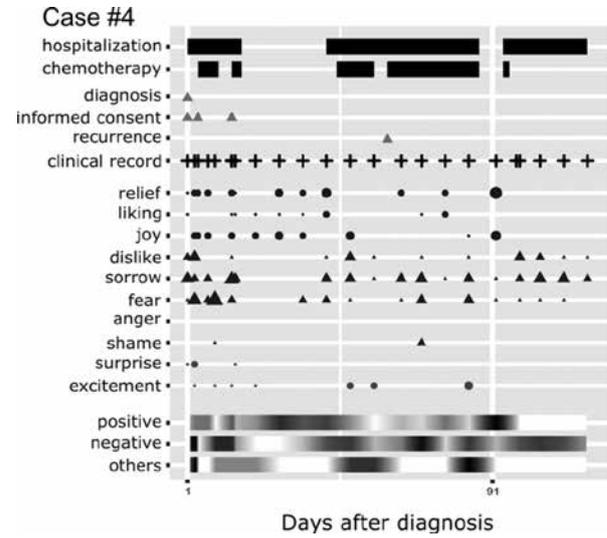
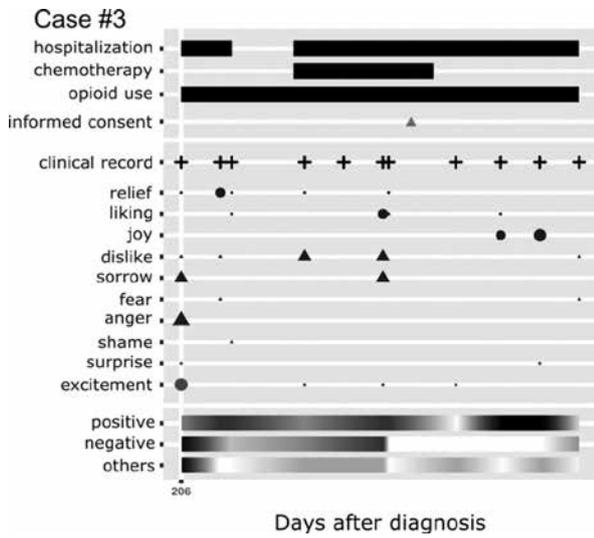
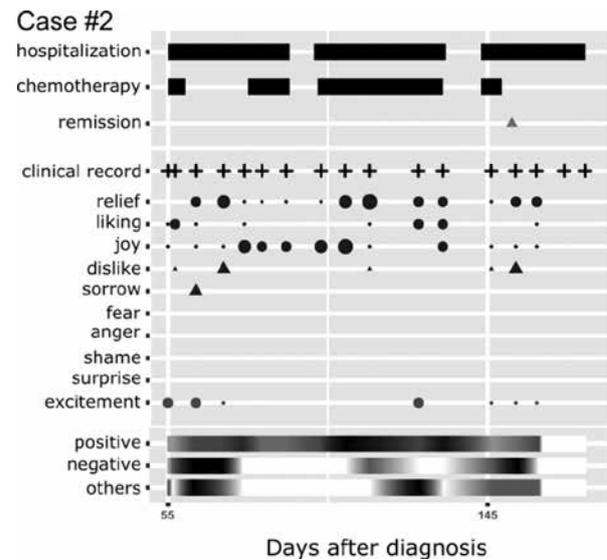
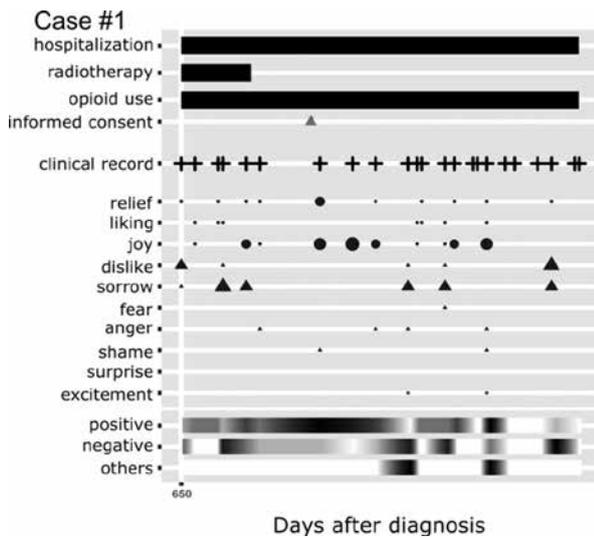
frequently the emotion occurred, the darker it was plotted.

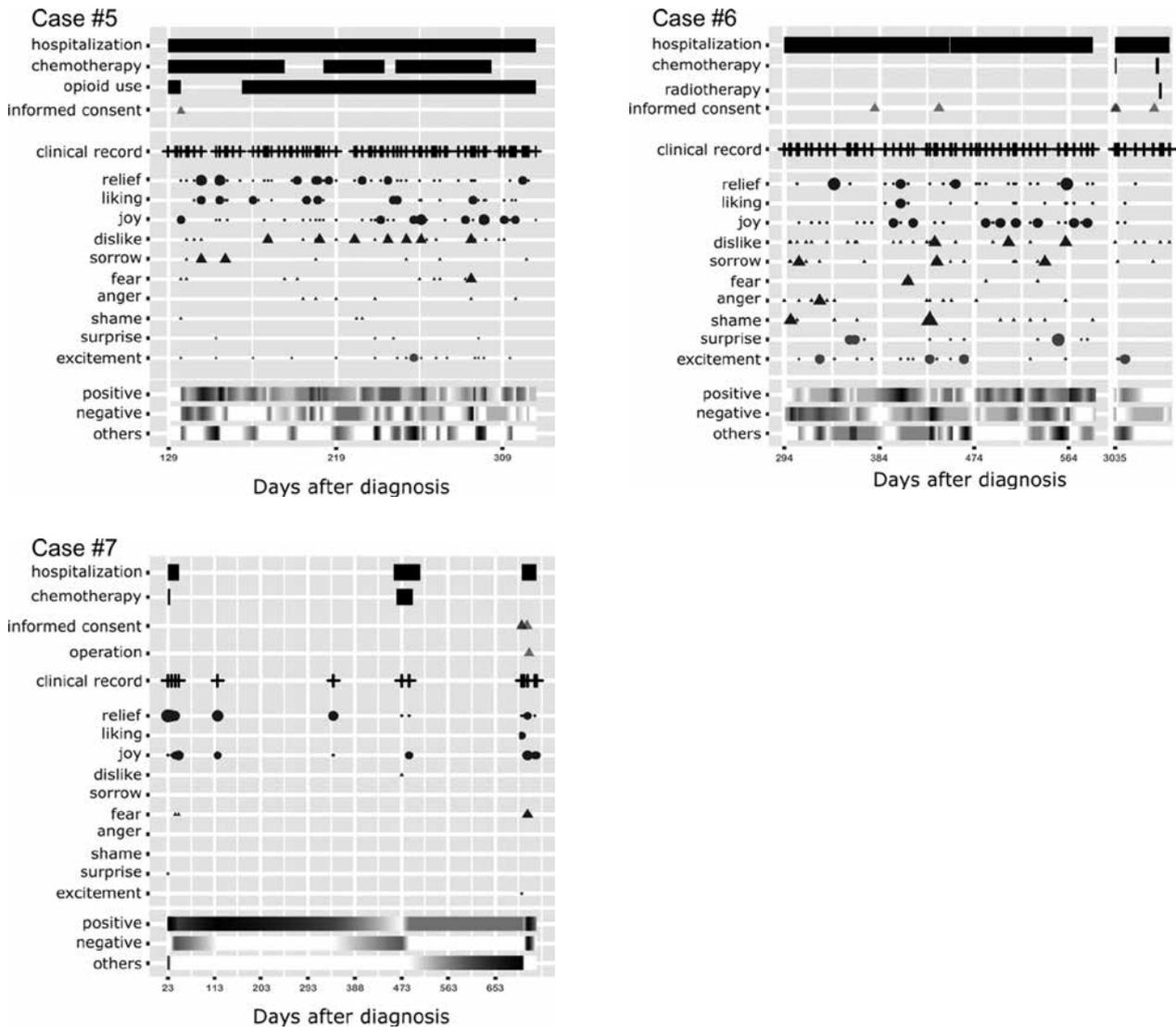
RESULTS

Emotional classification data according to the procedure are shown in Table 1. There were a total of 211 psychological interview records for the seven cases. The observation period for each case ranged from 3.7 to 21 months. Ten types of emotion were counted 820 times in total and included an average of 3.9 types of emotion per psychological interview record. The quantified emotion type was expressed as [emotional states map in clinical course] (Fig. 1) and was presented in order from short observation periods.

Overall characteristics observed in the emotional state map in clinical course

In all cases, 6 to 10 types of emotion appeared along the course of treatment, and the timing of their appearance varied among individuals (Fig. 1). The types of emotion include positive and negative emotions, but almost all cases showed both emotions simultaneously. In addition, in cases 1, 3, 4, and 6, which began with negative emotions at the time of the introduction of psychological support, there were generally frequent positive





**Figure 1.** Plot of the appearance of clinical course and emotional types of cases 1–7  
 The day when the cases were diagnosed with cancer was set to 0, and we counted the point where there was a medical record of our hospital. According to emotional types, the black circle represents positive emotion, black triangle negative emotion, and grey circle other emotion type. The size of the plot indicates how often it appeared at that time. The plot was presented in order from the case with a short observation period.

emotions – <joy>, <relief>, and <liking> – from the second and fifth psychological interview records. Of the clinical events, most cases provided informed consent and underwent chemotherapy. Opioids were administered in cases 1, 3, and 5, and radiotherapy was prescribed in cases 1 and 6. Remission, diagnosis, and recurrence occurred in cases 2 and 4. In all but one case, negative types of emotion appeared. In general, the emotional state map showed that the type of emotion tended to vary at every moment along the clinical course.

*Emotional states of each cases*

The patient in case 1 displayed more negative than positive emotions at first, but positive emotions of <joy> became predominant after opioid use and radiotherapy. The patient in case 2 experienced remission, although contradictory emotions such as <relief> and <dislike> appeared at that moment. The patient in case 3 showed negative emotions predominantly at first but turned to <joy> 273 days after being notified. The patient in case 4 frequently showed negative emotions of <sorrow> and <fear>, but positive emotions of <relief> and <joy> were also shown at

the same time. In the patient in case 5, positive emotion was predominant, but the same level of <dislike> and <sorrow> appeared as well. The patient in case 6 showed negative emotions of <dislike> and <sorrow> predominantly because of frustration toward the postponed discharge due to poor outcome after transplantation. However, the physician provided additional explanations and allowed him to stay overnight at home, and the positive emotion of <relief> appeared consequently. The patient in case 7 had the longest observation period, which lasted 21 months. The positive emotions of <relief> and <joy> were mainly shown at first; however, the negative emotion of <fear> became predominant due to anxiety of the operation in the latter half.

**DISCUSSION**

*Features of this research method*

We classified the patients’ speech and behavior described in the psychological interview record by the psychologist while

interpreting the emotions in context. Although there are several previous studies of the psychological state of cancer patients (1, 19, 21-25, 34), all of them used a one-time assessment through semi-structured interviews. In the present study, since documents based on the “psychological interview records” described in the medical record in the past were used, it became possible to find the change in psychological state from several months to more than a year. In addition, there is the advantage that patients are less tense than in a structured interview, and the influence of the distortion by the mind defense caused by the passage of time different from the recollection method is small. The characteristic of the document we used in the present study was useful for understanding the environments and psychological state of cancer patients who received active treatment. In addition, the tendency of the appearance of the types of emotion was clarified by quantifying the types of emotion, as shown in the “emotional state map in clinical course.” This is the first study that visualized the psychological and emotional states that cancer patients experience, over time, with changes in the course of treatment.

#### *Characteristics of positive emotions and negative emotions*

It is noteworthy that the positive emotions, <joy>, <relief>, and <liking>, frequently occurred in patients with cancer patients during active treatment (Fig. 1). Reports on positive emotions in cancer patients have been limited (17, 35), and negative emotions have been attracting more attention (9, 13, 18). The negative emotions shown in palliative care consultations include anxiety, sadness, and anger/frustration. In the present study, there were some conceivable causes for frequent positive emotions, one of which was the effect of hospitalization. The inpatient environment may have made it easier for patients to communicate their mental and physical pain to medical staff and to receive care. The psychological interview that we offer may also facilitate patients’ emotional communication. Patients were forced to respond to medical events that occurred a short while after they were notified of their disease. It is understandable for patients’ psychological state to differ in the active treatment stage, in which <relief> appears after severe treatment, and <joy> appears as an expectation for recovery as a result of treatment. In addition, <thanks> to the medical staff was classified as <joy> and has been observed frequently, which might be another example of increased positive emotions by obtaining an appropriate response from the medical staff. Even in such stressful situations (36, 37), it was seen that positive emotions occur. In line with a previous study (35), appropriate care by medical professionals may have existed.

#### *Characteristics of fluctuating psychological and emotional states of cancer patients in the active treatment stage*

The present analysis made it possible to visualize the relationship between the psychological and emotional states and positive/negative emotions of cancer patients in the active treatment stage, as well as how they fluctuate in treatment events and medical professional responses. It is presumed that the patient perceives and expresses pathological body changes and pain after obtaining a reaction from the medical staff and family and then re-recognizes their own physical state and emotions. In this way, examining the psychological and emotional states of stressful during active treatment cancer patients throughout the treatment process, from the diagnosis and notification to the introduction of treatment, has become possible.

We found that the psychological and emotional states of cancer patients in the active treatment stage were a mixture of positive and negative emotions and had varied continuously during the clinical course and in response to medical staff. Cancer patients

are better recognized to have a variable and dynamic psychological state, rather than in a single fixed psychological state. This helps us to understand the true state of the patient.

#### *Future issues and possibilities*

In one of the few studies that focused on the objective emotions of cancer patients, it was shown that emotions were related to the appearance of an emotional tendency (35), personality characteristics (36), and positive/negative emotions. In this study, it is necessary to consider the relationship between individual characteristics such as individual emotional regulation ability (38), sex differences, and age (37).

The analysis method in this study can be applied to other diseases, such as intractable diseases.

In addition, it can be applied not only in the active treatment stage but also in the terminal stages of cancer. A classic study on the psychological processes of cancer patients mentioned “the acceptance process of death” (39, 40) by Kübler-Ross. The application of this study makes it possible to examine the process of acceptance of death in modern Japan. In the future, we plan to elucidate the psychological and transition characteristics of Japanese cancer patients in a study with a larger sample size.

## CONCLUSION

From the psychological interview records of seven Japanese cancer patients in the active treatment stage, the changing psychological and emotional state of cancer patients during the treatment process was clarified by the type of emotion in the patient’s speech and behavior and the creation of an emotional state map. It was revealed that positive emotions are frequent even in stressful treatment processes, they continue to change through the clinical course and upon interaction with the patient, and they exhibit a variable psychological and emotional state as a result of the relationship between the medical staff and the patient. This analysis method allowed patient’s understanding to see throughout the treatment process.

## CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

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