

Emotional Responses to Persistent Chemotherapy-induced Peripheral Neuropathy Experienced by Patients with Colorectal Cancer in Japan

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ABSTRACT

Objective: For patients who wish to continue treatment for persistent chemotherapy-induced peripheral neuropathy (PCIPN) while maintaining the quality of life (QOL), the only effective way appears to be the stop-and-go strategy. The objective of the present study was to analyze emotional responses of Japanese patients with colorectal cancer (CRC) experiencing PCIPN for the first time and to consider effective ways of providing supportive nursing care. **Methods:** In all, 25 patients with metastatic CRC who had completed more than six courses receiving first-line therapy with modified FOLFOX6 were included. Data were collected through semi-structured interviews. **Results:** Emotional responses to PCIPN experienced by patients with CRC fell into the following categories: (1) suffering from an inability to cope with the previously unknown sensation of numbness, (2) inability to perform daily living activities

of daily living [ADL]/instrumental activities of daily living [IADL] independently and feeling fear for physical safety, (3) feeling a sense of relief at being able to live the same life as before, and (4) facing the threat of cancer and tolerating the numbness caused by the life-supporting treatment. Fear, helplessness, dismay and other uncomfortable feelings represented 72.5% of all emotional responses, probably reflecting the lack of effective intervention for PCIPN. **Conclusions:** These results suggest that both subjective and objective assessments of PCIPN and proper use of a stop-and-go strategy are essential for treatment continuation and maintenance of patient's QOL; therefore, an integrated approach is desirable.

Key words: Cancer chemotherapy, descriptive qualitative study, emotional response, quality of life, semi-structured interview

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Introduction

The incidence of colorectal cancer (CRC) in Japan is almost the same as that reported in Japanese immigrants in America or Caucasians in Western countries.^[1,2] CRC is now the second leading cause of cancer-related death in Japan. Oxaliplatin (trans-/-diaminocyclohexane oxalatoplatinum [L-OHP]), approved in April 2005 in Japan, has been established as a standard chemotherapeutic agent for CRC. With the recent approval of bevacizumab, an antibody directed against vascular endothelial growth factor, and cetuximab, an antibody directed against endothelial growth factor receptor, the overall survival period of patients with CRC has notably increased; the median survival time (MST) of patients with incurable, unresectable advanced/recurrent CRC has now exceeded 20 months. This is a remarkable advance, as until recently, best supportive care, which was associated with an MST of as short as 8 months, was the only option for patients with this disease.

However, according to de Gramont *et al.*,^[3] L-OHP has characteristic adverse effects, significantly, Chemotherapy-induced peripheral neuropathy (CIPN). Acute neuropathy develops within 1 to 2 days after the start of the administration, manifesting as marked paresthesia around the mouth (circumoral paresthesia) and in the hands/feet.^[4] Persistent CIPN (PCIPN), defined as CIPN persisting for more than 14 days, causes impairment of the activities of daily living (ADL), such as writing or doing up buttons, because of numbness in the limbs.^[5-8] Nevertheless, according to Cassidy and Misset,^[9] the symptoms may disappear only as late as 13 months after drug discontinuation in 78% of the patients, adversely affecting the quality of life (QOL) of the patients. PCIPN is cumulative and extremely difficult to control, therefore causing pain.^[10,11]

Neuropathy caused by L-OHP is not only associated with discomfort, but also with dose-limiting toxicity. The potential of Goshajinnkigan, other Kampo drugs^[12,13] and duloxetine to alleviate this toxicity has been investigated.^[14] Duloxetine is recommended (moderate evidence) for the treatment of CIPN. The primary treatment for CIPN is dose reduction/discontinuation of the offending chemotherapeutic agent.^[15] PCIPN is becoming a growing problem among patients undergoing cancer chemotherapy.

For patients who wish to maintain their QOL while continuing treatment, the only effective way is to adopt the stop-and-go strategy proposed by Tournigand *et al.*^[16] and Nakayama *et al.*^[17] These studies suggest that the L-OHP stop-and-go strategy with S-1 as the maintenance therapy is oncologically feasible and is associated with a very low incidence of Grade 3 neurotoxicity. For this purpose,

PCIPN should be detected early and introduced to the stop-and-go strategy. Furthermore, completion of treatment with L-OHP without interruption is necessary for obtaining a prolongation of the survival rate. Due to the “contextual culture” of the Japanese people,^[18] they tend not to easily reveal personal information. Therefore, it is the responsibility of the medical professionals to convey concrete information to Japanese CRC patients experiencing peripheral neuropathy for the first time, so that they can put their emotional responses into words. Such verbalized information will be helpful in judging whether the treatment should be continued or discontinued.

The objective of the present study was to analyze emotional responses of Japanese patients with CRC experiencing PCIPN for the first time and to consider effective ways of providing supportive nursing care.

Methods

This is descriptive qualitative study. We performed a qualitative inductive study with the goal of factor exploration. Emotional responses were defined as emotions and the associated thoughts and ideas induced by PCIPN. Participants were outpatients suffering from cancer who had completed more than six courses of chemotherapy with L-OHP, understood the study objectives, and consented to participate in the study. The selection of subjects was conducted expediently with the cooperation of the staff of the outpatient unit.

As PCIPN mainly consists of subjective sensations, the emotion(s) associated with the experience should be expressed in the patient's own words. Accordingly, semi-structured interviews were used to investigate the thoughts and feelings associated with the numbness and PCIPN experienced by the patients to identify the specific emotional responses induced by PCIPN. The same researcher conducted all the interviews for any given subject and roughly asked the same questions of all the subjects. The interview lasted for 30–60 min. and was held in a room where privacy could be ensured. In the interviews, the subjects were asked to frankly speak about their experiences associated with numbness and PCIPN. The content of the interview was recorded on tape with the participant's consent and later transcribed into text. Data were collected from September 2010 to March 2011.

Statistical analysis

From the transcripts of the data obtained during the semi-structured interviews, the descriptions of emotions/thoughts/ideas associated with PCIPN were extracted and inductively analyzed using the Berelson content analysis method.^[19] (1) PCIPN-related emotions and associated thoughts/ideas were extracted in minimal

meaningful units and converted into codes. (2) Codes representing similar meanings/content were merged and abstracted to form subcategories. (3) Subcategories representing similar meanings/content were merged, abstracted on the basis of the essential characteristics and categories were formed. Two professionals with experience in qualitative research related to cancer nursing were asked to perform the analysis, and Scott's agreement rate^[19] between categories and subcategories was calculated. In the present study, the agreement rate was determined to be 83.2%.

The study was carried out with the approval of the Ethical Committee of the participating institutions (approval number 8-30). In accordance with the study guidelines, an oral explanation of the study was provided to all participants, including in regard to the objective and content of the study, privacy protection and participation at one's own free will, and written consent was obtained. Data were kept anonymous so that the participants cannot be identified.

Results

In all, 25 patients provided consent and were interviewed. The patients consisted of 14 males (56.0%) and 11 females (44.0%), of whom 4 (16.0%) were employed. Nine patients (36.0%) met the Neurotoxicity Criteria of DEBIOPHARM (DEB) for Grade 1 (within 7 days) neuropathy, and 16 (64.0%) fulfilled the criteria for Grade 2 (more than 7 days) neuropathy. The mean age was 61.9 years (standard deviation [SD], 10.3 years), and the mean treatment frequency was 10.3 times (SD, 5.1) [Table 1].

The 25 subjects expressed a total of 186 recorded units of emotional responses, from which 10 subcategories and 4 categories were extracted. These categories consisted of the following: (1) suffering from inability to cope with the previously unknown sensation of numbness (46.2%); (2) inability to perform (ADL/instrumental activities of daily living [IADL]) independently and feeling fear for physical safety (17.7%); (3) feeling a sense of relief at being able to live the same life as before (27.4%); and (4) facing the threat of cancer and tolerating the numbness caused by the life-supporting treatment (8.6%) [Table 2].

Hereafter, each category is represented by [], each subcategory is represented by < >, and each code is represented by { }. The characteristics of each category are described below. The category [Suffering from inability to cope with the previously unknown sensation of numbness] consisted of the following subcategories: <Feeling anxious that the numbness may increase, necessitating a change in treatment>, <Feeling a sense of helplessness about the inability to cope with the previously unknown sensation of

Table 1: Overview of participants (n=25)

| Items | n (%) |
|--|-------------------------|
| Gender | |
| Male | 14 (56.0) |
| Female | 11 (44.0) |
| Employed | |
| Yes | 4 (16.0) |
| No | 21 (84.0) |
| DEB-NTC* | |
| Grade 1 | 9 (36.0) |
| Grade 2 | 16 (64.0) |
| PS** | |
| 0 | 7 (28.0) |
| 1 | 17 (68.0) |
| 2 | 0 |
| 3 | 1 (4.0) |
| Mean age | 61.9±10.3 (35-81) years |
| Mean treatment frequency | 10.3±5.1 (7-31) times |
| *DEB-NTC: Neurotoxicity criteria of DEBIOPHARM - Grade 1: Within 7 days, Grade 2: More than 7 days, **PS: Performance status - Grade 0: Fully active; able to carry on all predisease performance without restriction, Grade 1: Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, for example, light house work, office work, Grade 2: Ambulatory and capable of all self-care but unable to carry out any work activities. Up and about >50% of waking hours, Grade 3: Capable of only limited self-care, confined to bed or chair >50% of waking hours | |

numbness>, and <feeling fear of losing important things and even getting killed>. All patients expressed unpleasant feelings associated with the numbness never experienced before.

Participant A made the following statements: *"I felt anxious since I did not know to what extent the numbness would increase and whether the symptom would ever be cured, but no one was able to give me satisfactory answers. I could not write, which was most disgusting. If I knew about the consequences of numbness, I could decide what to do, but I did not know. I cannot decide whether I should continue or discontinue the treatment, which disgusts me. If the numbness becomes worse, I may have to change or discontinue the treatment. Just like anyone else, I also do not know my life span. So, I feel very, very uneasy."* From these and other statements, the code {feeling anxious that the treatment may need to be changed if the symptoms do not improve or worsen further} was extracted.

Participant B stated, *"Recently, I have started feeling limb discomfort like I have never experienced before; I have severe numbness with a tingling sensation that often changes to pain, often embarrassing me."* From this, the code {embarrassed by an unknown chronic tingling sensation never experienced before} was extracted. From 2 codes including {accepting drug adverse reactions that cannot be treated} and the above code, the subcategory <A sense of helplessness about the inability to cope with the previously unknown sensation of numbness> was formed.

Participant C stated, *"This medicine spoilt my entire body, although they said only the peripheral nerves would be affected. The medicine gives me the fear of bad symptoms, such as those*

Table 2. Emotional responses to peripheral neuropathy experienced by colorectal cancer patients: number of codes (%)

| Category | Sub-category | Code example |
|---|---|---|
| Suffering from inability to cope with the previously unknown sensation of numbness 86 (46.2%) | Feeling anxious that the numbness may increase, necessitating a change in treatment 46 (24.7%) | Embarrassed by the fact that the numbness was not relieved when it got warmer, because numbness was thought to be caused by coldness Feeling anxious that the treatment may need to be changed if the symptom does not improve or worsens further |
| | Feeling a sense of helplessness about the inability to cope with the previously unknown sensation of numbness 24 (12.9%) | Embarrassed by an unknown chronic tingling sensation never experienced before Accepting drug adverse reactions that cannot be treated |
| | Feeling fear of losing important things and even getting killed 16 (8.6%) | Imagery of serious symptoms and feeling a fear of death Inability to perform activities that could be easily performed on a daily basis and feeling fear that the activities cannot be performed ever again |
| Inability to perform daily living activities (ADL/IADL) independently and feeling fear for physical safety 33 (17.7%) | Embarrassed by the inability to perform daily living activities 21 (11.3%) | Embarrassed by the inability to do what could be done before, necessitating help from others Restriction due to persistent numbness leading to an oppressive feeling |
| | Having no fun because numbness reduces the motivation to live and the range of social life activities 8 (4.3%) | Feeling depressed because the joy of engaging in hobbies such as communicating through emails or fishing is taken away Facing difficulty even in shopping at supermarkets and thinking it is too much trouble to go out |
| | Inability to use hands and feet well due to numbness and worrying about accidents 4 (2.2%) | Inability to use the feet well due to numbness and fearing the danger of falling and that driving a car is risky Feeling fear for physical safety because of the inability to move hands smoothly and often dropping things |
| Feeling a sense of relief at being able to live the same life as before 51 (27.4%) | Not feeling uneasy because of the absence of influence on life and the numbness being mild 39 (21.0%) | Not feeling uneasy because chronic numbness is not so severe once the transient acute numbness is relieved Feeling relieved because adverse reactions occur less frequently than expected Not feeling uneasy because the numbness has no influence on the daily life activities Not feeling very uneasy because many activities can be performed |
| | Feeling relieved because original coping strategies allow having fun 12 (6.5%) | Thinking that numbness is caused not only by drugs, but also by other factors Numbness is greatly affected by consciousness, because it is absent when concentrating on hobbies Not minding, because hobbies can be engaged in when the numbness is not severe Doing what I want to do because it has never increased numbness |
| Facing the threat of cancer and tolerating the numbness caused by the life-supporting treatment 16 (8.6%) | The life-supporting treatment is important and nothing can be done about the numbness 12 (6.5%) | If the disease is to be cured, numbness can be tolerated as nothing can be done about it Accepting numbness that is maintained to a degree allowing continuation of treatment |
| | Cancer is a threat to life and the only thing that can be done is to tolerate the numbness as a side effect of life-saving treatment 4 (2.2%) | Understanding that the presence of numbness is evidence of the efficacy of the drug Fear of the life threat posed by the cancer takes the mind off the severity of the numbness and enables tolerance of the numbness |

of Minamata disease and stroke, and makes me feel as if I have been taken to a different world. I have such a bad image of the medicine.” From this, the code {imagery of serious symptoms and feeling a fear of death} was extracted. From the code, {inability to perform activities that could be easily performed on a daily basis and feeling fear that the activities cannot be performed ever again} in addition to the above code, the sub-category <feeling fear of losing important things and even getting killed> was formed.

These expressed the unknown sensation of numbness never experienced before and a negative emotion bringing about an uncontrollable fear and feeling of helplessness.

[Inability to perform (ADL/IADL) independently and feeling fear for physical safety] consisted of the following subcategories: <Embarrassed by the inability to perform daily living activities>, <having no fun because numbness

has reduced the motivation to live and the range of social life>, and <feeling endangered by the possibility of accidents caused by the numbness>.

Participant D stated, “Acute numbness prevented me from doing kitchen work. I could not do kitchen work because of coldness and pain, which gave a lot of discomfort. But, this was temporary, and I became able to manage doing things. Chronic numbness necessitates support from others and irritates me, because I cannot even use a can opener or turn the page of a book. I feel miserable about my incompetence, and this is the hardest part.” From this, the code {embarrassed by the inability to do what could be done before, necessitating help from others} was extracted. Participant E stated, “I try not to use electric tools as I have a problem of numbness.” Participant F felt perplexed, stating “Other side effects disappear in 2–3 days. But this numbness is persistent, and I hate it.” From these and other

statements, the code {restriction due to persistent numbness leading to an oppressive feeling} was extracted, and the subcategory <embarrassed by the inability to perform daily living activities> was formed.

Participant G used to enjoy exchanging emails with people and stated, *“Using the keyboard to send emails was sometimes painful. While I could manage to use the keyboard, it caused pain and numbness. So, I hesitated to send emails and was depressed.”* From this and other statements, the code {feeling depressed because the joy of engaging in hobbies such as communicating through email or fishing is taken away} was extracted. In addition, Participant H talked about thinking that it was too much trouble to do shopping, *“I usually open a coin purse to pay with coins in supermarkets. But, I cannot take the coins out of the purse any more due to numbness, and have to ask the cashier to take the coins himself/herself, saying, ‘Sorry, please take the appropriate amount of money’.”* From this, the code {facing difficulty in shopping at supermarkets and thinking that it is too much trouble to go out} was extracted. From these 2 codes, the subcategory <having no fun because numbness reduces the motivation to live and the range of social life activities> was formed.

Participant I stated, *“Numbness causes differences between my intentions and actions and I cannot adjust the power appropriately for each action. This could lead to accidents and makes me anxious. I think I may fall when I take a step forward, and this annoys me very much. When I drive a car, I do not drive fast and step on the brake in advance because I have foot numbness. Accidents could happen anytime.”* Furthermore, participant J expressed uneasiness, saying, *“Numbness makes me feel that my feet are always swollen. I also feel unstable while standing and fall after just walking a few steps,” “my joints are frozen, and I feel like I will fall down the stairs,” and “I’m afraid of walking alone and feel even going to the toilet is cumbersome.”* From this, the code {inability to use the feet well due to numbness and fearing the danger of falling and that driving a car is risky} was extracted. Participant K stated, *“It is now difficult to even do up buttons and to write. I also dropped and broke 2 or 3 cups or dishes and I feel miserable. This is dangerous because I cannot move fast.”* From this and other statements, the code {feeling fear for physical safety because of the inability to move hands smoothly and often dropping things} was extracted. From these 2 codes, the subcategory <inability to use hands and feet well due to numbness and worrying about accidents> was formed. These expressed a state of mind in which the subjects cannot perform daily activities smoothly due to numbness in the limbs and a feel embarrassed due to the presence of danger.

[Feeling a sense of relief at being able to live the same life as before] consisted of two subcategories: <not feeling uneasy because of the absence of influence on life and the numbness being mild> and <feeling relieved because

original coping strategies allow having fun>. These expressed the participants’ sense of relief at being able to tolerate numbness or modified their awareness perception of the numbness.

Participant J expressed a sense of relief trying to cope with various problems, saying, *“I have come to tolerate numbness by slightly changing my lifestyle” and “the numbness gradually decreases over the week after the drip infusion, and I can even cook with my bare hands.”* Participant K stated, *“Foot numbness increased, but I have no particular trouble with it, because I do not use my feet to do anything. For now, I have no trouble doing up my buttons. The adverse reactions are much lighter than I thought.”* From this statement, 4 codes were extracted, including {not feeling very uneasy because many activities can be performed} and the subcategory <not feeling uneasy because of the absence of influence on life and the numbness being mild> was formed.

Participant N stated the following: *“I used to go on overseas trips, but I am old now and my spouse and I sometimes go on overnight trips. Because I seek stimulation, have purposes and enjoying my life, I do not mind the numbness.”* From these statements, the following codes were extracted: {not minding because hobbies can be engaged in when the numbness is not severe}. From 4 codes including the above, the sub-category <feeling relieved because original coping strategies allow having fun> was formed. These subcategories expressed the participants’ sense of relief at being able to live the same life as before while managing to cope with the numbness.

The category of [facing the threat of cancer and tolerating the numbness caused by the life-supporting treatment] included <life-supporting treatment is important and nothing can be done about the numbness> and <cancer is a threat to life and the only thing that can be done is to tolerate the numbness as a side effect of life-saving treatment>, expressing the willingness to live with severe side effects for the sake of survival. Participant M stated, *“I hope the numbness will decrease. But, I cannot receive the treatment if I do not want to suffer from numbness. Cancer treatment is more important than anything else and it is more important to ensure reduction in the size of cancer than to seek relief from the numbness. I can manage to cope with this degree of numbness and continue the treatment. If my disease is to be cured, I have to tolerate the numbness and can do nothing about it.”* From this, the code {life-supporting treatment is important, and nothing can be done about the numbness} was extracted. From this and another code, the subcategory <life-supporting treatment is important and nothing can be done about the numbness> was formed. In addition, participant S stated, *“Numbness will not kill me, but cancer is a threat to my life if it grows bigger. The thought that the anticancer drugs are doing their job allows me to tolerate the numbness. I have a strong will*

to continue the treatment even if the numbness were to become more severe. I have no intention to change the treatment just to obtain relief from the numbness. I feel desperate at the thought of dying from cancer. Cancer is the greatest threat. If I complain about numbness, I may not be able to receive any treatment."

From this, the code {fear of the life threat posed by cancer takes the mind off the severity of the numbness and enables tolerance of the numbness} was extracted. From this and another code, the sub-category <cancer is a threat to life, and the only thing that can be done is to tolerate the numbness caused by the treatment> was formed.

Discussion

Typically, PCIPN develops after L-OHP administration, and we divided the emotional response to neuropathy into four broad categories. Three of the categories, [suffering from inability to cope with the previously unknown sensation of numbness], [inability to perform (ADL/IADL) independently and feeling fear for physical safety] and [facing the threat of cancer and tolerating the numbness caused by the life-supporting treatment], possibly reflected the fact that there are no effective measures for ameliorating the symptoms, and accounted for 72.5% of all emotional responses.

The sensation of "numbness" imagined by Japanese people is based on the "pins and needles" sensation that is experienced in the traditional Japanese sitting position called seiza. It is a traditional Japanese culture especially incorporated on tatami mats. In seiza, the knees are generally bent 180° with the calves tucked under the thighs; sitting on heels and toes being pointed. Compared to the numbness caused by seiza which is temporary disappears within 2–3 min after changing posture, the numbness caused by (P) CPIN is persistent.

The subjects' experience was associated with an unknown fear that they had never felt before, and patients faced difficulty in managing it, with the feeling of a loss of the sense of control. The experience also included "inability to use hands and feet well due to numbness and worrying about accidents," as well as an emotional response to the cessation of treatment or reduction in the drug dosage on the basis of sound assessment by medical professionals.

At the same time, the emotional response shown in the category of "facing the threat of cancer and tolerating the numbness caused by the life-supporting treatment" is a response that shows the desire to survive no matter what pain and suffering one must bear, with treatment being the only way to escape the fear of cancer. This is in agreement with Bakitas,^[10] PCIPN as an expected and necessary consequence of chemotherapy that must be "put up with" or endured to achieve cure, prevent recurrence or avoid death.

In addition, this is consistent with a survey of the "preferred way of death" among Japanese individuals,^[20,21] which found that although there are individual differences, most people want to "fight cancer until they can accept that they have done all that they can." The fear of discontinuation of treatment and the assurance of being able to continue living into the near future with continued treatment may also be affected by the universal health-care system. However, not expressing their own suffering gives rise to a state in which the subjects cling to continuing treatment, even if their performance status and QOL greatly suffer.

The present study demonstrated that patients' harbor unpleasant feelings associated with the experience of PCIPN. In the assessment of patients, both ward nurses and outpatient nurses need to ask patients about their subjective feelings and to objectively grasp the degree of the disorder by quantifying it using the common toxicity criteria of the National Cancer Institute (NIC-CTC), the Functional Assessment of Cancer Therapy/Gynecologic Oncology Group-Neurotoxicity (FACT-GOG NTX), the European Organization for Research and Treatment of Cancer QOQ-C30 questionnaire, etc. Nurses have to inform the physicians of the results to allow all available drugs to be used by properly using the stop-and-go strategy. Particularly in outpatient settings, medical professionals interact with patients only for a short time. Nurses have the responsibility to understand the patients holistically, to obtain information without missing the influence of CIPN on daily life and the emotional responses to CIPN, and to detect symptoms early through multi-disciplinary cooperation. In addition, we also think that it is important to provide self-care education to patients before drugs are prescribed to increase the self-care skills and help maintain self-efficacy. Furthermore, the practice guidelines developed by the American Society of Clinical Oncology in 2014 made the following recommendation: There are still no agents that can be recommended for the prevention of CIPN. With regard to the treatment of existing CIPN, the best available data support the recommendation (moderate evidence) of treatment with duloxetine.^[22,23] Therefore, it is also imperative to consider the use of duloxetine through consultation with physicians.

The present study was limited to a target group, including only patients with CRC. Further research to develop appropriate assessment tools is required.

The results of the present study suggest that both subjective and objective assessment of PCIPN and proper use of the stop-and-go strategy are essential for the continuation of treatment and maintenance of the patients' QOL; therefore, an integrated approach is desirable.

Limitations

This study was limited to only those patients with CRC as the target group. In the future, it will be necessary to develop a scale for an integrated approach to evaluate their efficacy, considering the Japanese culture and emotional responses.

Conclusion

The objective of the present study was to analyze emotional responses of Japanese patients with CRC. In all, 25 patients with metastatic CRC who had completed more than six courses receiving first-line therapy with modified FOLFOX6 were included. Data were collected through semi-structured interviews. Emotional responses to PCIPN experienced by patients with CRC fell into the following categories: (1) Suffering from an inability to cope with the previously unknown sensation of numbness. (2) Inability to perform ADL/IADL independently and feeling fear for physical safety. (3) Feeling a sense of relief at being able to live the same life as before. (4) Facing the threat of cancer and tolerating the numbness caused by the life-supporting treatment. Fear, helplessness, dismay and other uncomfortable feelings represented 72.5% of all emotional responses, probably reflecting the lack of effective intervention for PCIPN.

These results suggest that both subjective and objective assessments of PCIPN and proper use of a stop-and-go strategy are essential for treatment continuation and maintenance of patients' QOL; therefore, an integrated approach is desirable. Our findings revealed that the improvement in treatment led to the increase in the survival of CRC which resulted in many emotional responses to PCIPN. In addition, it is necessary for these patients to continue treatment and maintain treatment dosage. In addition to this finding, the results also suggested that the patients' needs would need to be looked into, such as the needs of the patients who purposefully do not appeal their symptoms or express their emotions because they fear for the discontinuation of the treatment. It is the nurse's role to understand these information, such as the needs of the patients, and in addition, cooperate with other medical workers to maintain one's QOL by adapting the stop-and-go strategy.

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Conflicts of interest

There are no conflicts of interest.

References

- Katanoda K, Kamo K, Saika K, Matsuda T, Shibata A, Matsuda A, *et al.* Short-term projection of cancer incidence in Japan using an age-period interaction model with spline smoothing. *Jpn J Clin Oncol* 2014;44:36-41.
- Center for Cancer Control and Information Services, National Cancer Center, Cancer Statistics in Japan; 2013. Available from: <http://www.ganjoho.jp/data/professional/statistics/backnumber/2013/fig01.pdf>.
- de Gramont A, Figuer A, Seymour M, Homerin M, Hmissi A, Cassidy J, *et al.* Leucovorin and fluorouracil with or without L-OHP as first-line treatment in advanced colorectal cancer. *J Clin Oncol* 2000;18:2938-47.
- Hyoudo I. Drug information Sheet, Guide for Appropriate ELPLAT®, Tokyo: Yakult Honsha Company. T Limited. Interview form ELPLAT® for Jection; 2010. Available from: <http://www.qws-data.qlife.jp/meds/interview/4291410D1025>.
- Argyriou AA, Zolota V, Kyriakopoulou O, Kalofonos HP. Toxic peripheral neuropathy associated with commonly used chemotherapeutic agents. *J BUON* 2010;15:435-46.
- Paice JA. Clinical challenges: Chemotherapy-induced peripheral neuropathy. *Semin Oncol Nurs* 2009;25 2 Suppl 1:S8-19.
- Loprinzi CL, Reeves BN, Dakhil SR, Sloan JA, Wolf SL, Burger KN, *et al.* Natural history of paclitaxel-associated acute pain syndrome: Prospective cohort study NCCTG N08C1. *J Clin Oncol* 2011;29:1472-8.
- Smith EM, Bakitas MA, Homel P, Piehl M, Kingman L, Fadul CE, *et al.* Preliminary assessment of a neuropathic pain treatment and referral algorithm for patients with cancer. *J Pain Symptom Manage* 2011;42:822-38.
- Cassidy J, Misset JL. Oxaliplatin-related side effects: Characteristics and management. *Semin Oncol* 2002;29 5 Suppl 15:11-20.
- Bakitas MA. Background noise: The experience of chemotherapy-induced peripheral neuropathy. *Nurs Res* 2007;56:323-31.
- Toftthagen C. Patient perceptions associated with chemotherapy-induced peripheral neuropathy. *Clin J Oncol Nurs* 2010;14:E22-8.
- Shindo Y, Tenma K, Imano H, Hibino M, Yoshino K, Nakamura M. Reduction of oxaliplatin-related neurotoxicity by gosha-jinki-gan. *Gan To Kagaku Ryoho* 2008;35:863-5.
- Nishioka M, Shimada M, Kurita N, Iwata T, Morimoto S, Yoshikawa K, *et al.* The Kampo medicine, goshajinkigan, prevents neuropathy in patients treated by FOLFOX regimen. *Int J Clin Oncol* 2011;16:322-7.
- Kono T, Mamiya N, Chisato N, Ebisawa Y, Yamazaki H, Watari J, *et al.* Efficacy of goshajinkigan for peripheral neurotoxicity of oxaliplatin in patients with advanced or recurrent colorectal cancer. *Evid Based Complement Alternat Med* 2011;2011:418481.
- Hershman DL, Lacchetti C, Dworkin RH, Lavoie Smith EM, Bleeker J, Cavaletti G, *et al.* Prevention and management of chemotherapy-induced peripheral neuropathy in survivors of adult cancers: American Society of Clinical Oncology clinical practice guideline. *J Clin Oncol* 2014;32:1941-67.
- Tournigand C, Cervantes A, Figuer A, Lledo G, Flesch M,

- Buyse M, *et al.* OPTIMOX1: A randomized study of FOLFOX4 or FOLFOX7 with oxaliplatin in a stop-and-go fashion in advanced colorectal cancer – A GERCOR study. *J Clin Oncol* 2006;24:394-400.
17. Nakayama G, Kodera Y, Yokoyama H, Okuda N, Watanabe T, Tanaka C, *et al.* Modified FOLFOX6 with oxaliplatin stop-and-go strategy and oral S-1 maintenance therapy in advanced colorectal cancer: CCOG-0704 study. *Int J Clin Oncol* 2011;16:506-11.
 18. Son, Fa. Vague power of Japan. *The Base of Japanese Tradition: The Root of Japanese People's Vagueness.* PHP INTERFACE; 2009. p. 11-41.
 19. Arima A. *Content Analysis.* 5th ed. Kyoto: Nakanishiya Publishing Company (in Japan); 2014.
 20. Hirai K, Miyashita M, Morita T, Sanjo M, Uchitomi Y. Good death in Japanese cancer care: A qualitative study. *J Pain Symptom Manage* 2006;31:140-7.
 21. Miyashita M, Sanjo M, Morita T, Hirai K, Uchitomi Y. Good death in cancer care: A nationwide quantitative study. *Ann Oncol* 2007;18:1090-7.
 22. Hershman DL, Lacchetti C, Dworkin RH, Lavoie Smith EM, Bleeker J, Cavaletti G, *et al.* Prevention and management of chemotherapy-induced peripheral neuropathy in survivors of adult cancers: American Society of Clinical Oncology clinical practice guideline. *J Clin Oncol* 2014;32:1941-67.
 23. Smith EM, Pang H, Cirincione C, Fleishman S, Paskett ED, Ahles T, *et al.* Effect of duloxetine on pain, function, and quality of life among patients with chemotherapy-induced painful peripheral neuropathy: A randomized clinical trial. *JAMA* 2013;309:1359-67.