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**ORIGINAL** ARTICLE

## **Quality of Life During Chemotherapy in** Japanese Patients with Unresectable Advanced **Pancreatic Cancer**

Kaoru SHIBAYAMA<sup>1)</sup> Yasunori KAWAGUCHI<sup>2)</sup> Taiga OTSUKA<sup>3)</sup> Futa KOGA<sup>4)</sup> Shunya NAKASHITA<sup>4)</sup> Noriko OZA<sup>4)</sup> Norio URESHINO<sup>5)</sup> Eiji SADASHIMA<sup>6)</sup> Kentaro KUROBE<sup>7)</sup> Toshifumi KOSUGI<sup>8)</sup> Koichi SHINCHI<sup>1)</sup>

- 1) Institute of Nursing, Faculty of Medicine, Saga University, Saga, Japan
- 2) Department of Gastroenterology, Asakura Medical Association Hospital, Fukuoka, Japan
- 3) Minato Medical Clinic, Fukuoka, Japan
- 4) Department of Hepatobiliary and Pancreatology, Saga-Ken Medical Centre Koseikan, Saga, Japan
- 5) Department of Medical Oncology, Kimitsu Chuo Hospital, Chiba, Japan
- 6) Life Science Research Institute, Saga-Ken Medical Centre Koseikan, Saga, Japan
- 7) Department of Pharmacy, Saga-Ken Medical Centre Koseikan, Saga, Japan
- 8) Department of Palliative Care, Saga-Ken Medical Centre Koseikan, Saga, Japan

## ABSTRACT

Objectives: To assess the quality of life (QoL) in Japanese patients receiving standard chemotherapy for unresectable pancreatic cancer.

Patients and Methods: This prospective observational study included 30 Japanese patients with unresectable pancreatic cancer (PS 0-1) who were starting standard first-line chemotherapy. QoL was assessed using the European Organization for Research and Treatment for Cancer Quality of Life Core Questionnaire, version 3.0. Anxiety and depression were measured using the Hospital Anxiety and Depression Scale. Assessments were performed at baseline, 2 weeks, and then monthly during chemotherapy.

**Results**: At baseline, the global health status (GHS) score was low (50/100), and 9 patients (30%) were experiencing significant levels of mental distress. Scores for the GHS, five functional scales (physical, role, emotional, cognitive, and social), nine symptoms (fatigue, nausea and vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties), anxiety and depression generally did not deteriorate during chemotherapy. However, the QoL scores varied during chemotherapy according to the patients' characteristics. Patients who achieved tumor control tended to have well-controlled QoL scores. A high survival rate was significantly associated with having a high baseline GHS score.

Conclusions: Japanese patients with unresectable pancreatic cancer might maintain their QoL during standard chemotherapy, with tumor control being associated with well-controlled QoL. In addition, a high QoL at baseline was associated with a good prognosis. September 9, 2020

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kaorus@cc.saga-u.ac.jp (Kaoru SHIBAYAMA; Japan)

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## I. Introduction

Pancreatic cancer is the fourth leading cause of cancer-related death in Japan, with approximately 34,000 deaths estimated in 2017.<sup>1)</sup> While the number of patients is increasing, the 5-year survival rate remains as low as 7%, as most diagnoses occur at late disease stages.<sup>1)</sup>

The standard regimens for patients with unresectable pancreatic cancer are oxaliplatin / irinotecan/ fluorouracil/ leucovorin (FOLFIRINOX) or gemcitabine/nab-paclitaxel (GnP), which have improved QoL and overall survival (OS) relative to those for gemcitabine monotherapy in Western patients with advanced pancreatic cancer.<sup>2-5)</sup> Although phase II studies of FOLFIRINOX and GnP in Japanese patients with metastatic pancreatic cancer revealed equivalent efficacies to those reported in the original studies,<sup>6,7)</sup> the effects on the QoL remain unclear. Furthermore, FOLFIRINOX treatment may reduce the QoL, based on reports of elevated rates of toxicity in Japanese patients relative to those in Western patients (grades 3–4 neutropenia: 77.8% vs. 45.7%, febrile neutropenia: 22.2% vs. 5.4%).<sup>2,6)</sup> Thus, a modified FOLFIRINOX regimen (mFOLFIRINOX) has been generally used in Japan, as a phase II study of the mFOLFIRINOX regimen revealed a comparable response rate to that of FOLFIRINOX, with fewer adverse events.<sup>8,9)</sup>

In patients with advanced cancer, it is important to decide the treatment considering both benefits and risks according to individual needs.<sup>10)</sup> Since the prognosis of patients with advanced pancreatic cancer is very poor, their QoL should be considered as important as their duration of survival.

Additionally, among patients with various cancers, the overall prevalence of psychological distress is approximately 35%, and patients with pancreatic cancer have the poorest mental health on the basis of their anxiety and depression.<sup>11)</sup> Since psychological distress can interrupt chemotherapy,<sup>12)</sup> physical, psychological, social, and spiritual aspects of care should be considered for patients with advanced incurable cancer.<sup>10)</sup> Therefore, the present study investigated the QoL, based on multiple dimensions, in Japanese patients who were receiving standard chemotherapy for unresectable advanced pancreatic cancer.

## II. Methods

## 1. Study design and Patients

This prospective observational study evaluated Japanese patients with unresectable advanced pancreatic cancer and an Eastern Cooperative Oncology Group performance status (ECOG PS) of 0 or 1. ECOG PS is a simple useful scale to evaluate a patient's physical condition. It is commonly used to decide the indication of chemotherapy, and ECOG PS 0–1 means that the daily living abilities are almost preserved.<sup>13,14</sup> All patients

were treated using FOLFIRINOX, mFOLFIRINOX, or GnP as first-line chemotherapy. The study period was between January 1, 2016 and January 31, 2018.

## 2. Treatment regimens

The FOLFIRINOX regimen consisted of oxaliplatin (85 mg/m<sup>2</sup> as a 2-h intravenous infusion) followed by *I*-leucovorin after 30 min (200 mg/m<sup>2</sup> as a 2-h intravenous infusion), irinotecan (180 mg/m<sup>2</sup> as a 90-min intravenous infusion), and fluorouracil (an intravenous bolus of 400 mg/m<sup>2</sup> followed by a dose of 2,400 mg/m<sup>2</sup> as a 46-h continuous intravenous infusion) once every 2 weeks.<sup>2)</sup> The mFOLFIRINOX regimen involved reducing the irinotecan dose to 150 mg/m<sup>2</sup> and omitting the intravenous bolus of fluorouracil.<sup>8,9)</sup> The GnP regimen consisted of nab-paclitaxel (125 mg/m<sup>2</sup> as a 30-min intravenous infusion) followed by gemcitabine (1,000 mg/m<sup>2</sup> as a 30-min intravenous infusion) on days 1, 8, and 15, and every 4 weeks.<sup>4)</sup>

## 3. Assessment of treatment response

Contrast-enhanced computed tomography scans were reviewed to evaluate antitumor response according to the Response Evaluation Criteria in Solid Tumors (RECIST) version1.1<sup>15</sup>) at baseline and then every 2–3 months afterwards. Patients were divided into progressive disease (PD) and non-PD depending on the best response during the first-line chemotherapy.

## 4. Evaluating the QoL

The patients' QoL was assessed using the European Organization for the Research and Treatment of Cancer QoL Questionnaire C-30 (EORTC QLQ-C30) version  $3.0^{16}$  and the Hospital Anxiety and Depression Scale (HADS).<sup>17)</sup> The EORTC QLQ-C30 version 3.0 tool is a self-administered 30-item questionnaire for patients with cancer<sup>16)</sup> that evaluates the global health status (GHS), five functional scales (physical, role, emotional, cognitive, and social), and nine symptoms (fatigue, nausea and vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties). Responses to the questionnaire were transformed into scores of 0–100 according to the scoring manual, with higher scores for the GHS and functional scales indicating better levels of functioning, whereas higher scores for the symptom scales indicating worse symptoms. The validity of the Japanese version of the EORTC QLQ-C30 was established in a previous study.<sup>18)</sup>

The HADS questionnaire consists of 14 items and evaluates the degrees of anxiety and depression.<sup>17)</sup> Each item is rated on a 4-point scale (0–3), with a maximum score of 21 for anxiety and a maximum score of 21 for depression. Scores  $\geq$ 11 on either subscale are considered to indicate "significant" psychological morbidity, whereas scores of 8–10 represent "borderline" morbidity and scores of 0–7 represent "normal" levels. The validity of the Japanese version of the HADS was also established in a previous study.<sup>19)</sup> The



assessments were performed at baseline, 2 weeks, and then monthly after the initiation of chemotherapy.

## 5. Statistical analysis

Data are presented as medians (range) or numbers (percentage). Inter-group comparisons for each factor were preformed using the Mann–Whitney U test for continuous variables and the  $\chi^2$  test or Fisher's exact test for categorical variables. For continuous variables, the medians were used as the cutoff points to create categorical factors. The Friedman test followed by the Dunn–Bonferroni post-hoc test was used to evaluate longitudinal changes in the QoL scores. The OS interval was defined as the time from the start of chemotherapy to death from any cause, and was censored at the last follow-up for surviving patients. Differences in OS were evaluated using the Kaplan–Meier method and the log-rank test. The Cox proportional hazard model was applied to evaluate the effect of the GHS score while adjusting for potential confounding factors. *P*values <0.05 were considered statistically significant. All analyses were performed using IBM SPSS software (version 22.0; IBM Corp., Armonk, NY).

## 6. Ethical considerations

This study was conducted with the approval of the institutional review board of Saga-Ken Medical Centre Koseikan (approval number: 16-02-2-01). All the patients provided written informed consent before enrollment into the study.

## **III. Results**

### 1. Patient characteristics

Thirty patients were enrolled in this study; their baseline characteristics are shown in Table 1. The median age was 64 years (range: 47–79 years), and 60% of the patients were men. The median body mass index (BMI) was 20.7 kg/m<sup>2</sup> (range: 15.7–26.2 kg/m<sup>2</sup>) and 16 patients (53.3%) had BMI <21 kg/m<sup>2</sup>. All patients had an ECOG PS of 0 at baseline. Twenty-three patients (76.7%) had distant metastases, and the most common site of metastasis was the liver (40%). Eight patients were treated using FOLFIRINOX, 12 patients were treated using mFOLFIRINOX, and 10 patients were treated using GnP, as first-line chemotherapy. Seventeen patients (56.7%) subsequently received second-line chemotherapy and 6 patients (20%) received third-line chemotherapy. The median duration of follow-up was 6.0 months (range: 1–16 months).

<table 1=""> Baseline characteristics of the 30 patients</table>			
Age, years	64 (47–79)		
Male, n (%)	18 (60)		
BMI, kg/m <sup>2</sup>	20.7(15.7 - 26.2)		
ECOG PS 0, n (%)	30 (100)		
Working, n (%)	16 (53.3)		
Pancreatic tumor location, n (%)			
Head	13 (43.3)		
Body	10 (33.3)		
Tail	6 (20)		
Multicentric	1 (3.3)		
Stage, n (%)			
Locally advanced	7 (23.3)		
Metastatic	23 (76.7)		
Metastatic sites, n (%)			
Liver	12 (40)		
Lungs	3 (10)		
Peritoneum	4 (13.3)		
Other	4 (13.3)		
Biliary stent use, n (%)	8 (26.7)		
Opioid use, n (%)	9 (30)		
Non-opioid use, n (%)	11 (36.7)		
Celiac plexus block, n (%)	4 (13.3)		
First-line regimen, n (%)			
FOLFIRINOX	8 (26.7)		
mFOLFIRINOX	12 (40.0)		
GnP	10 (33.3)		

Data are expressed as medians (range) or numbers (percentage).

BMI, body mass index; ECOG PS, Eastern Cooperative Oncology Group performance status; FOLFIRINOX, oxaliplatin/irinotecan/fluorouracil//leucovorin; mFOLFIRINOX, modified FOLFIRINOX; GnP, gemcitabine plus nab-paclitaxel.

## 2. Baseline QoL

The baseline scores for each scale are shown in Table 2, with median scores on the functional scales ranging from 66.7 to 86.7. In contrast, the median GHS score was only 50 (out of a possible 100), and patients had poor scores for the symptom scales regarding fatigue, pain, insomnia, appetite loss, constipation, and financial difficulties (median:  $\geq$ 33.3). The median anxiety score was 7 and the median depression score was 8. Seven patients (23.3%) had borderline anxiety and 7 patients (23.3%) had significant anxiety. Twelve patients (40%) had borderline depression and 5 patients (16.7%) had significant depression. Thus, a total of 9 patients (30%) had clinical levels of mental distress (significant anxiety or depression, based on scores  $\geq$ 11).

## <Table 2> Changes in quality of life scores based on the EORTC QLQ-C30 and HADS tools from baseline to 6 months

	Baseline	0.5 month	1 month	2 months	3 months	4 months	5 months	6 months	n value	
EORTC QLQ-C	30								Promo	
Global health	50.0	50.0	50.0	50.0	50.0	50.0	58.3	58.3	0.989	
status	(16.7 - 91.7)	(0-100)	(0 - 91.7)	(0-100)	(0-83.3)	(33.3–91.7)	(8.3–100)	(16.7 - 91.7)		
Physical	86.7	80.0	80.0	80.0	80.0	80.0	86.7	86.7	0.953	
function	(53.3 - 100)	(33.3–100)	(26.7 - 100)	(26.7 - 100)	(26.7 - 100)	(53.3 - 100)	(13.3–100)	(33.3–100)		
Role	83.3	83.3	66.7	66.7	66.7	66.7	66.7	66.7	0.095	
function	(33.3–100)	(0-100)	(0-100)	(16.7 - 100)	(0-100)	(33.3–100)	(0-100)	(33.3–100)		
Emotional	66.7	83.3	83.3	83.3	70.9	91.7	83.3	83.3	0.000*	
function	(33.3–100)	(33.3–100)	(8.3–100)	(41.7–100)	(50-100)	(66.7 - 100)	(50 - 100)	(50 - 100)	0.036*	
Cognitive	83.3	83.3	83.3	83.3	83.3	83.3	83.3	66.7	0.040	
function	(33.3–100)	(33.3–100)	(16.7 - 100)	(33.3–100)	(0-100)	(50-100)	(16.7–100)	(0-100)	0.942	
Social	66.7	66.7	66.7	66.7	66.7	66.7	66.7	83.3	0.010	
function	(0-100)	(0-100)	(33.3–100)	(16.7 - 100)	(0-100)	(33.3–100)	(33.3–100)	(0-100)	0.218	
Fatigue	33.3	33.3	44.4	33.3	33.3	33.3	33.3	33.3	0.659	
Fatigue	(0-88.9)	(0-88.9)	(0-77.8)	(0-88.9)	(11.1–77.8)	(11.1-55.6)	(0-100)	(0-77.8)		
Nausea and	0	16.7	0	16.7	0	0	0	0	0.220	
vomiting	(0-50)	(0-50)	(0-83.3)	(0-100)	(0-83.3)	(0-50)	(0-33.3)	(0-66.7)	0.339	
Pain	33.3	0	16.7	16.7	16.7	0	0	0	0.106	
Pain	(0-100)	(0-66.7)	(0-83.3)	(0-100)	(0-100)	(0-66.7)	(0-100)	(0-83.3)		
Dyenneg	0	0	33.3	0	0	0	0	0	0 591	
Dyspiica	(0-33.3)	(0-33.3)	(0-66.7)	(0-66.7)	(0-33.3)	(0-33.3)	(0-33.3)	(0-33.3)	0.551	
Insomnia	33.3	0	33.3	33.3	33.3	33.3	33.3	33.3	0.620	
momma	(0-100)	(0-100)	(0-100)	(0-100)	(0-100)	(0-100)	(0-66.7)	(0-66.7)	0.000	
Appetite	33.3	33.3	33.3	33.3	33.3	16.7	33.3	0	0.632	
loss	(0-100)	(0-100)	(0-100)	(0-100)	(0-100)	(0-100)	(0-100)	(0-100)	0.002	
Constinution	33.3	33.3	0	33.3	33.3	33.3	33.3	33.3	0.222	
Constipation	(0-100)	(0-100)	(0-100)	(0-100)	(0-66.7)	(0-66.7)	(0-100)	(0-100)		
Diarrhoa	0	33.3	0	33.3	0	0	0	0	0.031	
Diarrica	(0-66.7)	(0-100)	(0-100)	(0-66.7)	(0-100)	(0-33.3)	(0-66.7)	(0-66.7)		
Financial	33.3	33.3	33.3	0	33.3	33.3	33.3	33.3	0.942	
difficulties	(0-100)	(0-66.7)	(0-66.7)	(0-100)	(0-100)	(0-66.7)	(0-66.7)	(0-100)		
HADS										
A	7	5	5	6	7	4.5	5	5	0.040	
Anxiety	(1-13)	(0-13)	(0-14)	(0-15)	(0-12)	(0-9)	(0-15)	(0-12)		
Depression	8	7	9	9	8	8	8	8	0.361	
	(0-15)	(0-15)	(0-15)	(0-15)	(0-15)	(0-13)	(0-17)	(0-14)		

Data are expressed as medians (range). Differences in the median values were evaluated using the Friedman test, and p-values of <0.05 were considered statistically significant. The QLQ C-30 scores for each scale range from 0 to 100. The HADS scores for each scale from 0 to 21.

\* Baseline vs. 4 months based on the Dunn–Bonferroni post-hoc test (p=0.032).

EORTC QLQ-C30, European Organization for the Research and Treatment of Cancer QoL Questionnaire C-30; HADS, Hospital Anxiety and Depression Scale.

## 3. Changes in the QoL during chemotherapy

The scores for the GHS, the five functions, and the nine symptoms did not generally deteriorate during chemotherapy (Table 2). In addition, the emotional function scores were improved at 4 months after starting chemotherapy, relative to baseline levels (p=0.032). Pain was well-controlled using opioids and celiac plexus blocks (Table 1). Although the anxiety scores fluctuated, there was a trend toward improvement after starting chemotherapy. However, the depression scores remained high.

Patients with lower BMI (<21 kg/m<sup>2</sup>) had poorer GHS and physical function scores, as well as greater fatigue, relative to those in patients with higher BMI ( $\geq$ 21 kg/m<sup>2</sup>) (Fig. 1a-c). Constipation was more commonly observed in men, whereas diarrhea was more common in women (Fig. 2a, b). Financial difficulties were more common in men and younger patients (<65 years) (Fig. 2c, 3a), especially in younger male patients (Fig. 3b).

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Similar tendencies were observed for reduced social functioning (Fig. 3c). Tumor control was associated with better function scores, as well as well-controlled pain, nausea/vomiting, appetite loss and constipation (Fig. 4). There were no significant differences in QoL scores according to the first-line regimen.



<Figure 1> Changes in quality of life scores according to the Body Mass Index. Data are expressed as medians (interquartile range). BMI of <21 kg/m<sup>2</sup> (n=16) vs. BMI of <21 kg/m<sup>2</sup> (n=14). \*p<0.05, \*\*p<0.01 from the Mann–Whitney U test. BMI, body mass index.



<Figure 2> Changes in quality of life scores according to sex. Data are expressed as medians (interquartile range). Male sex (n=18) vs. female sex (n=12). \*p<0.05, \*\*p<0.01 from the Mann–Whitney U test.



<Figure 3> Changes in quality of life scores according to age and sex. Data are expressed as medians (interquartile range). Age of <65 years (n=17) vs. age of  $\geq$ 65 years (n=13). Males who were <65 years old (n=11) vs. others (n=19). \*p<0.05, \*\*p<0.01 from the Mann–Whitney Utest.





<Figure 4> Changes in quality of life scores according to the progressive disease (PD) status. Data are expressed as medians (interquartile range). The best overall response during treatment was defined as progressive disease (PD) or all other results (Non-PD). PD (n=12) vs. Non-PD (n=12). \*p<0.05, \*\*p<0.01 on the Mann–Whitney U test.

### 4. Survival according to the baseline GHS score

We observed a significant difference in OS according to the baseline GHS score (median OS: 18.3 months for scores  $\geq 50$  vs. 6.4 months for scores < 50, p=0.043) (Fig. 5). The multivariate cox regression analysis revealed that GHS score was an independent predictive prognostic factor (HR: 4.355, 95% CI: 1.178, 16.106, p=0.027; Table 3). There were no significant differences in the baseline characteristics of patients with GHS scores  $\geq 50$  and < 50 (Table 4); however, the BMI tended to be lower in patients with GHS scores < 50 (median [range]: 19.1 [15.7-22.6] kg/m<sup>2</sup> vs. 21.3 [16.0-26.2] kg/m<sup>2</sup>).

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<Figure 5> Kaplan–Meier survival curves according to the baseline global health status (GHS) score. The median survival was 18.3 months in patients with GHS scores of  $\geq$ 50 (n=20) and 6.4 months in patients with GHS scores of <50 (n=10).

<Table 3> The Cox proportional hazard analysis of factors related to overall survival

parameters	adjusted HR (95%CI)	p value
GHS score≥50	4.355 (1.178, 16.106)	0.027
Age	1.105 (1.006, 1.213)	0.036
Sex (Female)	2.330 (0.670, 8.105)	0.183

HR, hazard ratio; 95%CI, 95% confidence interval.

<Table 4> Baseline patient characteristics according to their global health status score

	Baseline global health status score		
-	<50 (n=10)	≥50 (n=20)	<i>p</i> value
Age, years	64 (48–77)	64 (47–79)	0.846
Male, n (%)	5(50)	13 (65)	0.461
BMI, kg/m <sup>2</sup>	19.1 (15.7–22.6)	21.3(16.0-26.2)	0.061
Working, n (%)	7 (70)	9 (45)	0.260
Pancreatic tumor location, n			
Head/body/tail/multicentric	5/3/1/1	8/7/5/0	0.399
Metastasis, n (%)	9 (90)	14 (70)	0.372
Metastatic sites, n			
Liver/lung/peritoneum/other	5/0/2/2	7/3/2/2	0.547
Biliary stent use, n (%)	2 (20)	6 (30)	0.682
Opioid use, n (%)	3 (30)	6 (30)	1.000
Non-opioid use, n (%)	6 (60)	5 (25)	0.108
Celiac plexus block, n (%)	1 (10)	3(15)	1.000
First-line regimen, n			
FOLFIRINOX +	5/5	15/5	0.231
mFOLFIRINOX vs. GnP			

Data are expressed as medians (range) or numbers (percentage). Differences were evaluated using the Mann–Whitney *U*test for continuous variables and the  $\chi^2$  test or Fisher's exact test for categorical variables. Differences were considered statistically significant at *p*-values of <0.05. BMI, body mass index; FOLFIRINOX, oxaliplatin/irinotecan/fluorouracil/*P*leucovorin; mFOLFIRINOX, modified FOLFIRINOX; GnP, gemcitabine plus nab-paclitaxel.

## **IV. Discussion**

This prospective study evaluated the longitudinal changes in the QoL of Japanese patients who were receiving chemotherapy for unresectable advanced pancreatic cancer. These patients already had low QoL values before starting chemotherapy, especially in terms of the GHS and mental distress scores. However, these scores generally did not worsen during the chemotherapy treatment, which suggests that Japanese patients with advanced pancreatic cancer can maintain their QoL during standard chemotherapy, as previously observed in Western patients.<sup>3,5)</sup>

The rate of mental distress (30%) in the present study was comparable to that in previous studies (13-50%).<sup>20,21)</sup> For example, patients with pancreatic cancer may develop depressive symptoms before receiving a diagnosis of cancer.<sup>22,23)</sup> and a literature review has indicated that the pathophysiology can involve immunological effects (production of anti-serotonin antibodies), hormonal effects (increased urinary serotonin excretion), paraneoplastic effects (production of a false neurotransmitter), and biochemical effects (acid-base abnormalities, anemia, and metabolic abnormalities).<sup>24)</sup> Interestingly, while the depression score slightly improved immediately after starting chemotherapy, it subsequently regressed and then remained fairly consistent throughout the rest of the clinical course, regardless of the therapeutic effect. This suggests that various clinical and biological factors might influence mental status, which should be monitored in patients receiving chemotherapy for advanced pancreatic cancer. It has been reported that cognitive behavioral therapy might benefit cancer patients, mentally and physically, with an improvement in the  $QoL^{25}$  Therefore, it may be prudent to consider combining pharmacological therapy with nonpharmacological treatments, such as cognitive behavioral therapy.

The patients' characteristics were also associated with variability in QoL scores. For example, patients with lower BMI ( $<21 \text{ kg/m}^2$ ) had poorer GHS and physical function scores, with greater fatigue during chemotherapy. Furthermore, the effects on defecation were variable, with men typically experiencing constipation and women typically experiencing diarrhea. In addition, younger men (<65 years old) tended to experience the worst financial difficulties and lowest social functioning, which may be related to their role in supporting families. Therefore, these patients should be educated regarding the available social support systems.

Some studies have indicated that the baseline QoL can be used to predict survival outcomes.<sup>3,26)</sup> Similarly, the present study revealed that high baseline GHS scores were associated with good OS among patients receiving chemotherapy for advanced pancreatic cancer. Thus, the GHS score might be useful as a prognostic factor before starting chemotherapy for advanced pancreatic cancer, although further studies are needed to evaluate this possibility.

The present study has several limitations. First, the sample size was relatively small,

limiting the power of the analyses. Second, the study did not include a control group that did not receive standard chemotherapy. Thus, the findings might not generalize to all Japanese patients with pancreatic cancer. Nevertheless, the present study provided a prospective longitudinal evaluation of the QoL, and we are not aware of any similar studies that have examined multiple dimensions of the QoL in Japanese patients receiving chemotherapy for advanced pancreatic cancer. In clarifying the QOL of patients in multiple dimensions, including those that involve physical, psychological and social aspects, medical and nursing care may be improved.

## V. Conclusions

The present findings suggest that Japanese patients with unresectable advanced pancreatic cancer can maintain their QoL while receiving standard chemotherapy. Furthermore, tumor control was associated with improved QoL in this setting and the patients' QoL scores varied during chemotherapy, depending on various characteristics. In addition, high QoL at baseline was associated with a good prognosis. Therefore, we believe that it is important to monitor QoL before and during chemotherapy in patients with advanced pancreatic cancer.

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