The Brain Symptom and Impact Questionnaire in brain metastases patients: a prospective long-term follow-up study

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Executive summary

- The Brain Metastases Symptom and Impact Questionnaire (BASIQ) was developed to assess patient rated symptom severity and impact on daily life. Previous studies assessed content and psychometric validity at 1-month follow-up.
- Patients who received neurosurgery, radiosurgery or whole brain radiation were administered the BASIQ, Functional Assessment of Cancer Therapy-General (FACT-G), FACT-Brain (FACT-Br) at baseline and at 1, 2 and 3 months follow-ups.
- Eighty patients participated and 36 patients had complete follow-up data. Median age was 62 years old with median KPS of 80 (range 50–100).
- The BASIQ correlated well ($r \geq 0.40$) with all FACT-G and FACT-Br subscales at baseline and follow-up, except for social/family and emotional wellbeing.
- Linear regression analysis found no significant changes over time. Therefore, results of the two questionnaires coincide as both detected nonchanges.
- Despite there being no significant change in scores over time, there was a high attrition rate which likely encompassed patients who were too ill to complete the questionnaires.
- The ability of the BASIQ in evaluating symptoms and impact on daily life in patients with brain metastases over longer assessment periods was supported by the FACT questionnaires.

Aims: To assess the ability of the Brain Metastases Symptom and Impact Questionnaire (BASIQ) in evaluating symptoms and impact on daily life. **Patients & methods:** Patients with brain metastases completed BASIQ, Functional Assessment of Cancer Therapy-General, FACT-Brain at baseline and at 1, 2 and 3 months follow-ups. **Results:** Thirty-six patients completed all follow-ups. BASIQ correlated well ($r \geq 0.40$) with FACT subscales, except for social/family and emotional wellbeing. Linear regression analysis found no significant changes in quality

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of life (QOL) over time in both the BASIQ and FACT scales. Therefore, the two questionnaires coincide as both detected nonchanges. **Conclusion:** The ability of the BASIQ in evaluating symptoms and impact on over longer assessment periods was supported by the FACT questionnaires.

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KEYWORDS

- BASIQ • brain metastases
- quality of life

Accurately measuring quality of life (QOL) and patient-rated symptom experience is integral to assessing interventions from a patient's perspective. This is especially important for palliative treatments, which aim to reduce symptoms and improve QOL. Patients with brain metastases represent a unique patient population that have complex symptom experiences and generally limited life expectancy [1].

Treatment options for brain metastases include radiation, surgery and systemic therapy. Radiation may be given as whole brain radiotherapy (WBRT), or as stereotactic radiosurgery for high dose focused treatments. WBRT is typically given to patients with poor performance status and limited prognosis while stereotactic radiosurgery is usually used to treat patients with better prognosis. Regardless of the type of treatment offered, the goal remains the same to balance treatment toxicity with survival and disease control [2].

Questionnaires are an effective form of measuring these outcomes from the viewpoint of the patient. Previous studies from our center have reported on a new questionnaire designed specifically for patients with brain metastases [3,4]. Currently validated QOL questionnaires have limitations for use in this population, as they were designed for primary brain tumor populations and are quite lengthy. The most frequently used questionnaires being the Functional Assessment of Cancer Therapy – Brain (FACT-Br) used to supplement the FACT – General (FACT-G) and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire – Brain Neoplasm (EORTC QLQ-BN20) used in conjunction with the general QLQ-C30 [5–7].

The new brain metastases specific questionnaire, the Brain Symptom and Impact Questionnaire (BASIQ) has both content [3] and psychometric validity [4] been reported by previous studies. Thavarajah *et al.* [4] found the BASIQ to be reliable with good clinical and psychometric validity at 1-month follow-up after treatment for brain metastases. The 18-item

BASIQ offers advantages in terms of relevant content and less patient burden. The BASIQ is significantly shorter in length compared to both the FACT-Br (50 items) and EORTC QLQ-BN20 (50 items) as they utilize a general questionnaire and brain-specific subscale [8,9]. The purpose of the current study was to assess the ability of the BASIQ to monitor the symptoms and impact on daily life over a longer assessment period at 1, 2 and 3 months post treatment for brain metastases. Secondary objectives were to examine the correlation between the FACT-G and FACT-Br with the BASIQ over an extended assessment period.

Methods

• Eligibility criteria

Field-testing of the BASIQ was completed in patients over the age of 18 years, who were receiving treatment for single or multiple brain metastases. Informed consent was obtained during the time of clinic appointment. Participants were stratified into groups depending on the type of treatment; neurosurgical resection, radiosurgery/gamma knife or WBRT.

• Data collection

Baseline assessment was completed within the one week prior to treatment initiation. Demographics collected included; age, gender, Karnofsky Performance Status (KPS), year of diagnosis, number of brain metastases and others as listed in [Table 1](#). The questionnaires BASIQ, FACT-G (24 h) and FACT-Br (24 h) were administered at baseline, month 1, 2 and 3. The FACT questionnaires were asked in regard to symptoms and QOL in the past 24 h only, opposed to also using a recall period of the past week, in order to save patient burden and match the recall period of the BASIQ.

A trained research assistant administered baseline questionnaires at the time of the participant's clinic appointment. Patients ranked the items of BASIQ on a scale from 0 (not at all) to 10 (extremely), and FACT-G and FACT-Br from 0 (not at all) to 4 (very much). Research

assistants conducted monthly follow-up assessments in clinic whenever possible or over the phone. In addition to the questionnaires completed at follow-ups, information regarding current systemic treatment and hospitalization was collected.

• Questionnaires

Collected data were analyzed using the Statistical Analysis Software (SAS version 9.4 for Windows). A two-sided p-value of <0.05 was considered statistically significant. Descriptive analysis was performed on both the BASIQ and FACT-Br scales to determine the frequency. The two aggregate scales of the BASIQ (symptom and impact) were calculated, each of which was made up of a subset of individual items. The symptom domain score incorporates items 1–10, and the impact domain score items 11–18. The higher the score, the greater the symptom severity or relevance of the item. FACT-Br is made up of five domains; physical (GP1-GP7), social/family (GS1-GS7), emotional (GE1-GE6), functional (GF1-GF7) and additional concerns (Br1-An10). The FACT-G and FACT-Br can also be totaled into overall scores. Questions with opposite meanings are reversed to maintain consistency during analysis. Higher scores on FACT-Br items represent lower symptom severity, and better QOL.

• Statistical analysis

Multitrait scaling was used to determine if BASIQ can be grouped into scales by detecting item convergent validity [10], defined as a correlation of ≥ 0.40 between an item and its scale [11]. Success of item scaling was supported when the correlation between an item and its own scale was significantly higher than the correlation to other scales. Reliability with multi-item scales was assessed using Cronbach's alpha coefficient of ≥ 0.70 as the threshold for internal consistency [12].

Three approaches were used to assess validity of the questionnaires; correlation analysis, known group comparisons and responsiveness over time. All tests were employed from baseline to month 1–3. Correlation analysis was performed by evaluating Pearson's product moment correlations between FACT-Br and BASIQ scales. Threshold for substantial conceptual correlation between scales was $r \geq 0.40$ [11]. Wilcoxon rank-sum nonparametric test was applied to explore known-group comparisons.

Table 1. Patient demographics.

Demographic	Data
Age (years):	
– n	80
– Median (range)	62.0 (24–90)
KPS:	
– n	80
– Median (range)	80 (50–100)
KPS distribution:	
– 50	7 (8.75%)
– 60	5 (6.25%)
– 70	14 (17.50%)
– 80	16 (20.00%)
– 90	20 (25.00%)
– 100	18 (22.50%)
Years from primary cancer to brain cancer:	
– n	78
– Median (range)	0 (0–14)
Distribution:	
– 0	40 (51.28%)
– 1	14 (17.95%)
– 2	5 (6.41%)
– 3	4 (5.13%)
– 4	7 (8.97%)
– 5	1 (1.28%)
– 6	1 (1.28%)
– 7	1 (1.28%)
– 8	1 (1.28%)
– 10	1 (1.28%)
– 11	1 (1.28%)
– 13	1 (1.28%)
– 14	1 (1.28%)
Patients group:	
– A: Neurosurgery + radiotherapy	1 (1.25%)
– B: Radiosurgery +/- WBRT	50 (62.50%)
– C: WBRT alone	29 (36.25%)
ECOG score:	
– 0	38 (47.50%)
– 1	30 (37.50%)
– 2	12 (15.00%)
Gender:	
– Female	42 (52.50%)
– Male	38 (47.50%)
Primary cancer site:	
– Lung	46 (57.50%)
– Breast	8 (10.00%)
– Melanoma	8 (10.00%)
– Renal	6 (7.50%)
– Bladder	2 (2.50%)
– Colon	3 (3.75%)
– Other	4 (5.00%)
– Unknown	3 (3.75%)
Accrual:	
– Radiotherapy clinic	80 (100.00%)

ECOG: Eastern Cooperative Oncology Group; WBRT: Whole brain therapy.

Table 1. Patient demographics (cont.).

Demographic	Data
Out/in-patients:	
– Outpatient	75 (93.75%)
– Inpatient	5 (6.25%)
Married status:	
– Married	53 (66.25%)
– Single	10 (12.50%)
– Divorced	5 (6.25%)
– Widowed	6 (7.50%)
– Separated	3 (3.75%)
– Partner	3 (3.75%)
Cohabitants:	
– Spouse	36 (45.00%)
– Spouse and children	21 (26.25%)
– Alone	11 (13.75%)
– Child(ren)	5 (6.25%)
– Other	7 (8.75%)
Education level:	
– Elementary school	3 (3.75%)
– High school	37 (46.25%)
– College	12 (15.00%)
– University	20 (25.00%)
– Masters or PhD	8 (10.00%)
Employment status:	
– Retired	41 (51.25%)
– Employed	26 (32.50%)
– Unemployed	13 (16.25%)
Number of brain metastases:	
– 1	21 (26.25%)
– 2–3	19 (23.75%)
– >3	40 (50.00%)
Number of brain metastases (2 categories):	
– 1	21 (26.25%)
– >1	59 (73.75%)
Other site of metastasis (79 available patients):	
– Bone	21 (26.58%)
– Lung	17 (21.52%)
– Liver	9 (11.39%)
– Lymph	4 (5.06%)
– Other: adrenal, kidney, breast, spleen	5 (6.33%)
– None	43 (54.43%)
Previous chemotherapy:	
– No	46 (57.50%)
– Yes	34 (42.50%)
Previous hormotherapy:	
– No	73 (92.41%)
– Yes	6 (7.59%)

ECOG: Eastern Cooperative Oncology Group; WBRT: Whole brain therapy.

This measure tested the sensitivity of the questionnaires to discriminate between subgroups of patients with KPS ≤ 80 and KPS > 80 performance status. Effect size was calculated to determine the magnitude of these differences and was interpreted according to the following criteria;

small effect size is 0.20, medium effect size is 0.50 and large effect size is 0.80 [13]. The final test for validity was questionnaire responsiveness over time, which was measured by the linear regression analysis. The patient's condition inevitably changes over time, along with QOL, therefore it is important for questionnaires to accurately detect and measure this change.

Results

• Demographics

There were a total of 80 patients accrued to this long-term study. Basic demographics are listed in Table 1. There were slightly more females (52.5%) versus males (47.5%), median age was 62 years old and median KPS was 80 (range 50–100). The most common primary cancer sites were lung (57.5%), breast (10%) and melanoma (10%). Using Kruskal–Wallis nonparametric test, there was no significant difference ($p > 0.05$) in patients with breast, lung, renal or other primary cancer sites at baseline for both the BASIQ and FACT scales. All patients were accrued in a radiotherapy clinic, and only five patients (6.3%) were inpatients at the time of accrual. Sociodemographic variables were collected as well; 53 patients were married (66%), 36 lived with a spouse (45%), 41 were retired (51%) and 37 had high school as their highest education level (46%).

The average time from diagnosis of primary cancer to brain metastases was 1.8 years, however, half of the patients ($n = 40$) were diagnosed with brain metastases and their primary cancer in the same year. Only 21 patients (27%) had a solitary metastasis, and the remaining 59 patients (73%) had multiple brain metastases. Approximately half of patients did not have other sites of metastases ($n = 43$, 54%); among those with other sites of metastases, bone was the most common site ($n = 21$, 3%). Treatment groups were stratified as follows: neurosurgery + radiotherapy ($n = 1$, 1%), radiosurgery +/- WBRT ($n = 50$, 62.5%) and WBRT alone ($n = 29$, 36%). Of those patients who received radiosurgery, only two also received WBRT in conjunction.

Follow-up data collected at month 1, 2 and 3 can be found in Tables 2 & 3. We chose a follow-up period of 3 months to allow for a long-term follow-up and a sufficient sample size, as most studies in this patient population have high attrition rates even at 1 month follow-up. PFS and OS were not included as one of the study end points.

The number of patients hospitalized at baseline, month 1, 2 and 3 were five, four and six patients, respectively. There were a total of 13 patients who expired within the 3-month period. Some patients could not be reached or were too ill to complete the questionnaires. There were only 36 patients with complete data for all 3 months. Completion rates were 45 patients at month 1, 41 patients at month 2, and 36 patients at month 3, respectively. Dexamethasone dose information was available for 74 patients, half of which were receiving dexamethasone at baseline. Previous systemic treatments prior to baseline included chemotherapy (42.5%) and hormone therapy (8%).

• Descriptive analysis

The BASIQ mean scores for items 1–18 were calculated at baseline and month 1, 2 and 3 (Figure 1). The mean symptom scale increased from baseline (21.2) to month 1 (22) and month 2 (24.9), and decreased back to baseline levels at month 3 (21.1). The mean impact scale was relatively stable at baseline (12.2), month 1 (12.4) and month 2 (12.0), but decreased at month 3 (10.1). Lower scores on the BASIQ are favorable as they represent less symptom severity and interference. The FACT-G and FACT-Br scores are illustrated in Figure 2. The FACT-Br total score increased from baseline (110.4) to month 1 (112.6) and month 2 (111.8), and decreased back to baseline levels at month 3 (110.5). Higher scores on FACT are favorable as they represent better QOL. The BASIQ (symptom scale) and FACT both detected slight changes in scores, but a return to baseline levels at month 3.

• Multitrait scaling

Analysis for the BASIQ and FACT scales found that all item-own scale correlations exceeded the 0.40 criterion and correlated higher with their own scales than with other scales at baseline and follow-up. The Cronbach's alpha coefficients were 0.68–0.79 for the symptom scale and 0.85–0.89 for the impact scale at baseline to month 3 (Table 4). The Cronbach's alpha coefficients were all ≥ 0.70 for the FACT, except for the social/family wellbeing at month 1 (Table 5). Cronbach's alpha showed good reliability at each visit and remained stable from baseline to month 3.

• Clinical validity

Scales of the BASIQ and FACT-G/FACT-Br were correlated to examine the ability of the scales to detect clinical changes. The BASIQ

Table 2. Systemic treatment changes at monthly follow-ups.

Events	n (%)
At month 1	
Change in chemotherapy	
– No	31 (73.81%)
– Yes	11 (26.19%)
Change in hormone therapy	
– No	42 (100.00%)
– Yes	0 (0.00%)
Hospitalization	
– No	38 (90.48%)
– Yes	4 (9.52%)
At month 2	
Change in chemotherapy	
– No	27 (69.23%)
– Yes	12 (30.77%)
Change in hormone therapy	
– No	38 (97.44%)
– Yes	1 (2.56%)
Hospitalization	
– No	33 (84.62%)
– Yes	6 (15.38%)
At month 3	
Change in chemotherapy	
– No	21 (61.76%)
– Yes	13 (38.24%)
Change in hormone therapy	
– No	32 (94.12%)
– Yes	2 (5.88%)
Hospitalization	
– No	29 (82.86%)
– Yes	6 (17.14%)

symptom and impact scale correlated with almost all of the FACT-G/FACT-Br subscales at baseline and monthly follow-ups ($r > 0.40$). However, the symptom scale was not conceptually correlated with the social/family wellbeing subscale at baseline, month 1 and month 3, or the emotional wellbeing subscale at baseline, month 1 and month 2. The impact scale was not conceptually correlated with the social/family wellbeing subscale at baseline and month 3, or the emotional wellbeing subscale at baseline and month 1. Analysis was also performed for scales changing over time from baseline to each follow-up time point. From baseline to month 1 the following were not correlated ($r < 0.40$): BASIQ symptom and impact scales with social/family and emotional wellbeing subscales; for baseline to month 2, symptom scale with social/family and emotional wellbeing and impact scale with social/family, emotional and functional

Table 3. Dexamethasone dosing at baseline.

Dexamethasone use/dose	n (%)
At baseline (n = 80)	
Dexamethasone dose (mg):	
– N with the information	74
– Median (range)	0.3 (0–16)
Dexamethasone use:	
– No	37 (50.00%)
– Yes	37 (50.00%)
Dexamethasone dose (mg/day):	
– 0.5	1 (1.35%)
– 2	1 (1.35%)
– 4	9 (12.16%)
– 6	2 (2.70%)
– 8	12 (16.22%)
– 12	3 (4.05%)
– 16	9 (12.16%)

wellbeing subscales; for baseline to month 3, both the symptom and impact scale with emotional and functional wellbeing, and only the impact scale with social/family wellbeing subscale.

Known-group comparisons in the BASIQ were completed to compare patients with KPS >80 and KPS ≤80. There were significant differences between the KPS subgroups for both BASIQ scales at baseline and month 3, and impact scale at month 1. Patients with KPS ≤80 were more likely to have higher scores on the symptom (26.1 vs 15.7) and impact (18.4

vs 5.4) scales compared to others at baseline ($p < 0.0001$), higher impact scale scores (18.3 vs 7.8) at month 1 ($p = 0.007$) and higher scores on symptom (28.7 vs 16.8) and impact (16.5 vs 6.5) scales at month 3 ($p = 0.026$ and $p = 0.031$, respectively). In the FACT-G and FACT-Br, patients with lower performance status (KPS ≤80) had significantly lower physical (17.7 vs 23.4), social/family (23.7 vs 26.1) and functional (17.3 vs 20.1) wellbeing at baseline ($p < 0.05$); at month 1, more likely to have lower social/family (23.6 vs 26.3) and functional (16.4 vs 21.0) wellbeing ($p < 0.05$); at month 2, more likely to have lower social/family wellbeing (23.7 vs 25.0; $p = 0.043$) and at month 3 more likely to have lower physical wellbeing (17.8 vs 22.2; $p = 0.032$). The findings from both the BASIQ and FACT questionnaires coincide as patients with lower performance status are more likely to experience greater symptom severity and lower wellbeing at baseline and post treatment. Despite small numerical changes in the BASIQ and FACT scores, linear regression analysis found no significant differences over time from baseline to month 3 in both questionnaires.

Discussion

The BASIQ questionnaire has previously undergone content and psychometric validation [3,4]. The current results mirror those of the first

Figure 1. Mean BASIQ scores (0–10) at baseline (n = 80) and follow-up months (n = 45, 41 and 36 at month 1– 3); higher scores representing more symptoms or more interference with the activity.

Figure 2. Mean FACT-G and FACT-Br subscales and total scores at baseline (n = 80) and follow-up months (n = 45, 41 and 36 at month 1 to 3); higher scores representing better wellbeing.

study, which only used a 1-month follow-up, and found that both the BASIQ and FACT results corresponded and found no significant differences over time [4]. The current study followed patients for up to 3 months after baseline, and thus examined the ability of the BASIQ to assess long-term QOL in patients with brain metastases. In this study, no significant differences were detected by the linear regression analysis. Furthermore, at any time point there was strong correlation between the BASIQ and FACT scales ($r \geq 0.40$). FACT is considered a validated and

reliable questionnaire [5] and is commonly used in brain metastases studies [8]. The BASIQ results detecting nonchanges correspond with those of the validated FACT questionnaires.

Due to the lack of significant changes in scores over time, this provides evidence regarding the ability of palliative treatments to reduce or stabilize symptoms and QOL [14–16]. However, this does not necessarily need to be viewed as a failure of treatments to impact wellbeing, as QOL was preserved over a long time period following treatment. Of course a major

Table 4. Scaling analysis of the Brain Symptom and Impact Questionnaire (n = 80).

Scale	Item-own scale correlation	Item-other scale correlation [†]	Cronbach's alpha
At baseline			
BASIQ: Symptom scale	0.42–0.77	0.22–0.67	0.68
BASIQ: Impact scale	0.66–0.85	0.51–0.67	0.89
At month 1			
BASIQ: Symptom scale	0.33–0.72	0.22–0.70	0.70
BASIQ: Impact scale	0.64–0.82	0.37–0.67	0.88
At month 2			
BASIQ: Symptom scale	0.26–0.84	0.28–0.78	0.75
BASIQ: Impact scale	0.55–0.87	0.32–0.61	0.86
At month 3			
BASIQ: Symptom scale	0.51–0.88	0.38–0.90	0.79
BASIQ: Impact scale	0.48–0.82	0.46–0.74	0.85

[†]The absolute values are displayed for scale correlation.
BASIQ: Brain Symptom and Impact Questionnaire.

Table 5. Multitrait scaling analysis for Functional Assessment of Cancer Therapy questionnaire (n = 80).

Scale	Item–own scale correlation	Item–other scale correlation [†]	Cronbach's alpha
At baseline			
Using 50 items for FACT-Br scale			
Physical wellbeing subscale score	0.636–0.873	0.039–0.774	0.876
Social/family wellbeing subscale score	0.443–0.753	0.011–0.547	0.890
Emotional wellbeing subscale score	0.498–0.802	0.064–0.494	0.751
Functional wellbeing subscale score	0.261–0.796	0.017–0.734	0.716
FACT-G total score	0.420–0.853	0.031–0.854	0.652
BrC subscale score	0.069–0.675	0.001–0.650	0.718
FACT-Br total score	0.397–0.907	0.031–0.977	0.758
FACT-Br TOI	0.817–0.923	0.205–0.977	0.812
At month 1			
Using 50 items for FACT-Br Scale			
Physical wellbeing subscale score	0.422–0.826	0.015–0.736	0.827
Social/family wellbeing subscale score	0.433–0.888	0.061–0.779	0.471
Emotional wellbeing subscale score	0.587–0.890	0.157–0.566	0.826
Functional wellbeing subscale score	0.395–0.834	0.054–0.729	0.805
FACT-G total score	0.685–0.861	0.353–0.877	0.764
BrC subscale score	0.018–0.840	0.008–0.792	0.731
FACT-Br total score	0.650–0.922	0.353–0.985	0.809
FACT-Br TOI	0.802–0.923	0.353–0.985	0.790
At month 2			
Using 50 items for FACT-Br scale			
Physical wellbeing subscale score	0.573–0.822	0.155–0.696	0.834
Social/family wellbeing subscale score	0.598–0.888	0.153–0.869	0.896
Emotional wellbeing subscale score	0.563–0.840	0.001–0.592	0.752
Functional wellbeing subscale score	0.045–0.833	0.016–0.727	0.799
FACT-G total score	0.703–0.817	0.314–0.825	0.774
BrC subscale score	0.001–0.790	0.009–0.728	0.749
FACT-Br total score	0.701–0.909	0.314–0.981	0.810
FACT-Br TOI	0.790–0.910	0.314–0.981	0.758
[†] The absolute values are displayed for scale correlation FACT-Br: Functional Assessment of Cancer Therapy – Brain; FACT-G: Functional Assessment of Cancer Therapy – General; TOI: Trial Outcome Index.			

Table 5. Multitrait scaling analysis for Functional Assessment of Cancer Therapy questionnaire (n = 80) (cont.).

Scale	Item–own scale correlation	Item–other scale correlation [†]	Cronbach's alpha
At month 3			
Using 50 items for FACT-Br scale			
Physical wellbeing subscale score	0.616–0.836	0.098–0.772	0.869
Social/family wellbeing subscale score	0.611–0.894	0.052–0.797	0.888
Emotional wellbeing subscale score	0.538–0.804	0.067–0.753	0.825
Functional wellbeing subscale score	0.040–0.899	0.004–0.795	0.840
FACT-G total score	0.615–0.833	0.229–0.891	0.746
BrC subscale score	0.258–0.778	0.008–0.734	0.725
FACT-Br total score	0.578–0.930	0.229–0.987	0.811
FACT-Br TOI	0.811–0.932	0.229–0.987	0.816
[†] The absolute values are displayed for scale correlation FACT-Br: Functional Assessment of Cancer Therapy – Brain; FACT-G: Functional Assessment of Cancer Therapy – General; TOI: Trial Outcome Index.			

limitation of the study is the large attrition rate, not uncommon to studies involving patients with brain metastases [8–9,17]. Those who did not complete the questionnaire were likely declining and had worse QOL compared with those who were able to complete the questionnaires. The attrition rate may also explain the relative stability in scores as the complete follow-up results include patients who were functioning well at home and were feeling well enough to complete the follow-up questionnaires. It is also a possibility that the high attrition rate may have produced nonsignificant time trends due to lack of statistical power. Though this study showed no significant trends, there are likely clinically relevant changes when considering all brain metastases patients, and not just those who complete the questionnaires. Future studies should focus on better capturing these patients who decline following treatment for brain metastases to get a more comprehensive view of this patient group. Strategies could include testing the proxy-reported quality of life of patients using BASIQ to reduce the attrition rate. As this study tested BASIQ in conjunction with FACT, an improved rate of questionnaire completion was not expected due to the large number of questions. The authors are hopeful that in future studies using only the BASIQ, patient burden will be reduced and compliance will increase. Additional exploration into the

specific patient groups of those who improved, declined or remained stable should also be an area of future study.

A strong correlation was found between both questionnaires for the majority of comparisons. One exception was the social/family and emotional wellbeing subscales being poorly correlated with the BASIQ ($r < 0.40$). This is consistent with the trend found in the first psychometric validation paper, which previously explained this is to be expected as BASIQ focuses only on physical symptoms and their impact on daily life [4]. Performance status is a predictor for survival and wellbeing in advanced cancer [18,19]. The BASIQ and FACT identified similar results, which showed that patients with lower performance status were more likely to experience worse symptoms and lower QOL. As the scales were accurately able to discriminate between performance status subgroups, the psychometric and clinical validity of the BASIQ is strengthened.

Studies investigating the QOL in patients with brain metastases undergoing treatment have used a variety of tools that make comparison between studies difficult. These questionnaires can be quite long and burdensome to complete, especially in the palliative cancer population [1]. High attrition rates are common to these studies, but by using more applicable and concise surveys, adherence can be maximized.

BASIQ was designed specifically for this population and contains 18 items related to symptoms and their impact on daily life. BASIQ is a reliable instrument, has undergone both content [3] and psychometric validation at 1 month [4], and now can be used to assess the long-term QOL in patients with brain metastases. The ability of the BASIQ in evaluating symptoms and impact on daily life in patients with brain metastases over longer assessment periods was supported by the FACT questionnaires.

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