

Comparing the Use of the Taiwanese Depression Questionnaire and Beck Depression Inventory for Screening Depression in Patients with Chronic Pain

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Background: Studies have shown that the validity of self-reported depression questionnaires may be influenced by somatic symptoms such as chronic pain. The purpose of this study was to compare the validity of two self-reported questionnaires, the Taiwanese Depression Questionnaire (TDQ) and the Beck Depression Inventory (BDI), for screening depression in patients with chronic pain.

Methods: One hundred patients with chronic pain were enrolled and assessed using the TDQ, BDI, McGill Pain Questionnaire, and Structured Clinical Interview for DSM-III-R. Seventy-three of them were diagnosed with depressive disorders. Conventional validity indices of the TDQ and BDI were examined and compared.

Results: Both the TDQ and BDI had satisfactory sensitivity, specificity, positive predictive value, and negative predictive value. Our results showed a trend that the validity of the TDQ was better than that of the BDI, and the validity of the cognitive/affective components of the TDQ was significantly better than that of the BDI.

Conclusion: Our results suggest that the TDQ is superior to the BDI in detecting depression in patients with chronic pain in Taiwan.
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Key words: Beck Depression Inventory, chronic pain, Taiwanese Depression Questionnaire, validity

Depression is one of the most prevalent psychiatric disorders in patients with chronic pain, ranging from 10% to 87%.⁽¹⁻³⁾ Accurate detection of depression in these patients is difficult due to the overlapping symptoms of the pain syndrome and depression.^(4,5) Patients with chronic pain with depression had poorer treatment outcomes and

greater physical impairments than patients without depression.^(6,7) Hence, early identification and effective treatment of depression are crucial for treating patients with chronic pain.

The Beck Depression Inventory (BDI)⁽⁸⁾ has been widely used as a self-reported questionnaire for assessing depression in patients with chronic pain

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and medical diseases with considerable accuracy.⁽⁹⁻¹²⁾ Because somatic discomforts often overlap symptoms of chronic pain and depression, some studies have explored how the validity of the BDI was influenced by the somatic items.⁽¹³⁻¹⁵⁾ In an early study, it was found that the measurement of depression was confounded by pain severity, which suggested that a cognitive/affective subscale may be a more accurate measurement of depression.⁽¹⁵⁾ For example, Geisser et al. found that the removal of somatic items slightly decreased the accuracy of the BDI in detecting depression in chronic pain patients.⁽¹³⁾ Whether the BDI or its cognitive/affective component is valid to screen for depression in these patients needs further study.

Previous studies have shown that different cultures have different modes for expressing emotion and suggested that western depression rating scales have certain limitations in detecting depression in Chinese patients.^(16,17) It was found that the Chinese version of the BDI had limited applicability due to the lack of satisfactory culture-sensitive validity of some items.⁽¹⁷⁾ Thus, we developed a culture-sensitive depression screening questionnaire, the "Taiwanese Depression Questionnaire" (TDQ).⁽¹⁸⁾ For detecting depression in the community sample, we found that the Cronbach's α coefficient (internal consistency of reliability) was 0.90, and the area under the Receiver Operating Characteristic (ROC) curve was 0.922. The 18-item TDQ had a sensitivity of 0.89 and a specificity of 0.92 at a cut-off point of 19.⁽¹⁸⁾ These results suggested that the TDQ is adaptable for screening depression in the community and might be useful for detecting depression in patients with chronic pain.

Hence, the aim of this study was to examine and compare the validity of the TDQ and BDI in detecting depression in patients with chronic pain. Furthermore, to determine whether somatic symptoms influenced the screening of depression, the validity of these two questionnaires was examined after removing their somatic items.

METHODS

Target population

Patients with chronic nonmalignant pain for more than 6 months were consecutively sampled from a pain clinic at a medical center in southern

Taiwan. The pain clinic was staffed by two physicians, – a pain specialist and a psychiatrist. Each subject was at least 18 years of age. Patients who were unable to be interviewed, or had difficulty understanding questions read aloud were excluded from this study.

Instruments

Taiwanese Depression Questionnaire (TDQ)

The TDQ, which is a 4-point scale with 18 items, is a culturally specific depression self-rating instrument for effective screening of depression in Taiwan and has satisfactory reliability and validity.⁽¹⁸⁾ Subjects are guided to rate each item on a scale from 0 to 3 on the basis of "how often you felt the physical and emotional aspects during the past week". TDQ scores range from 0 to 54.

Beck Depression Inventory (BDI)⁽⁹⁾

The BDI is a widely used rating scale for depression and has been translated into many languages, including Chinese.⁽¹⁹⁾ The Chinese version of the BDI-I was used in this study. The BDI-II⁽²⁰⁾ was not used because no validated Chinese version⁽²¹⁾ was available at the time of the study.

Structured Clinical Interview for DSM-III-R, Patient edition (SCID-I/P)

The SCID was translated into Chinese and used in a cross-cultural study examining neurasthenia and chronic fatigue.⁽²²⁾ DSM-III-R diagnoses were made using the SCID interview, supplemented by the DSM-III-R criteria for primary insomnia (which was not included in the SCID). SCID-I/P interviews were performed by Dr. Y. Lee, a senior psychiatrist who has received formal SCID training.

McGill Pain Questionnaire (MPQ)⁽²³⁾

The MPQ was designed to measure subjective pain experiences using a quantitative format. The MPQ consists of 20 groups of single-word pain descriptors; the words in each group increase in rank order intensity.

Procedures

After signing informed consent forms, the subjects were asked to complete the TDQ and BDI. Semi-structured interviews using the SCID were performed by Dr. Y. Lee, who was blind to the TDQ and

BDI results. Clinical pain diagnoses were made by a pain specialist (Dr. L.C. Yang). The MPQ interviews were conducted by a trained research assistant. Socio-demographic data were also collected.

Statistical analyses

Descriptive and inferential statistics were analyzed using SPSS for Windows V 11.5. Cronbach's α was applied to evaluate internal consistency of the TDQ and BDI. Cronbach's α was 0.90 for the TDQ⁽¹⁸⁾ and 0.89 for the BDI. These results indicated that these questionnaires had good internal consistency in this study. The SCID interview results were regarded as the gold standard for psychiatric diagnosis. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and efficiency were indices of the validity of the TDQ and BDI. ROC curve analysis was performed to optimize the cut-off points resulting in the best validity of the TDQ and the BDI. By using various cut-off scores for both instruments, the patients were categorized as being cases with depression or not. Sensitivity was plotted against the false positive rate for every possible cut-off points. The point where there was the largest area under the curve (AUC) was determined to have the best validity, and the larger AUC was regarded to be more valid.⁽²⁴⁾ Factor analysis for the TDQ was used in detecting potential somatic and cognitive/affective components, and to examine whether somatic symptoms influenced measurements of depression.

The method developed by Henley and McNeil⁽²⁵⁾ was utilized to assess whether there were differences in the areas under the ROC curves between the two questionnaires.

RESULTS

Sample characteristics

One hundred subjects, 68 women and 32 men, completed the study. Their mean age was 44.6 ± 12.8 years (Mean \pm SE). Sixty-four patients were married. The mean education level was 9.3 ± 4.1 years. The most frequent clinical pain diagnosis was headache (56%), followed by low back pain (10%). The severity of the pain was labeled as: severe (30%), moderate (45%), and mild (25%). The most common psychiatric diagnosis was major depressive disorder (32%), followed by dysthymic disorder

(29%), depressive disorder not otherwise specified (10%), and analgesics dependence (10%). Overall, 73 subjects (73%) were diagnosed with depressive disorders, 94 subjects (94%) had at least one psychiatric diagnosis (Table 1).⁽²⁶⁾

Factor analysis of TDQ

To assess the factorial composition of the TDQ, the principal components method of extraction was applied to the TDQ data for 100 patients with chronic pain. The correlation matrix produced two eigen values > 1.00 , suggesting two principal components. A loading was defined as salient when it was greater than 0.40. Salient loadings for the two factors are presented in Table 2. Factor 1 accounted for 41.7% of the variance and comprised positive loadings for 11 items, indicating a factor of cognitive and affective symptoms. Factor 2 explained 7.8% of the variance and comprised of seven items, the highest three

Table 1. Concurrent Psychiatric Diagnosis of Subjects Included in This Study

Category and diagnosis	Total (N = 100)
Depressive disorder	
Major depression	32
Dysthymia	29
Depressive disorder NOS	10
Depressive disorder due to general medical condition	1
Adjustment disorder with depressive mood	1
Substance abuse	
Analgesics abuse	10
Benzodiazepine abuse	3
Alcohol abuse	2
Anxiety disorders	
Generalized anxiety disorder	7
Obsessive compulsive disorder	2
Somatiform disorder	
Pain disorder	9
Undifferentiated somatiform disorder	1
Schizophrenia	4
Primary insomnia	5
Personality disorder	
Borderline personality disorder	5
Histrionic personality disorder	1
No Diagnosis	6

Abbreviation: NOS: not otherwise specified.

Table 2. Factor Loadings for the Factor Analysis of the TDQ

Item	Factor1	Factor 2
15. I felt miserable and even wanted to die.	0.785	0.102
1. I often felt like crying.	0.757	
14. I tended to look at the dark side of everything.	0.736	0.315
13. I felt less confident than before.	0.721	0.291
12. I was slower in thinking and doing things than before.	0.677	0.295
16. I lost interest in everything.	0.615	0.401
3. I felt more agitated than before.	0.575	0.394
18. I felt worthless.	0.554	0.314
10. I had poor memory.	0.544	
2. I felt blue and depressed.	0.515	0.471
11. I could not concentrate when doing things.	0.511	0.462
8. I felt tired and weak (“Xu”, “mo wan qi”).	0.261	0.778
7. I felt uneasy, uncomfortable.	0.256	0.659
5. I had a poor appetite.	0.227	0.637
9. I felt upset.	0.556	0.617
4. I had trouble sleeping.	0.120	0.598
6. I frequently had chest tightness (“sim-guan-tau-bang-bang”).	0.147	0.526
17. I felt sick. (headache, dizziness, palpitation, or abdominal distress).		0.458
Variance explained, %	41.7	7.8

Abbreviations: factor 1: cognitive/affective symptoms; factor 2: somatic symptoms.

positive loadings for weakness, uneasiness, and poor appetite indicated somatic symptoms (Table 2). The results suggested that TDQ had one predominant cognitive and affective component that can be verified using factor analysis.

Optimal TDQ and BDI cut-off scores and conventional validity index

To find the optimal cut-off point to detect depression in patients with chronic pain, we drew ROC curves based on various cut-off points for the TDQ and BDI (Figs. 1 and 2). The more the curve arched toward the upper left corner, the better validity the test differentiated those with depression from those without depression. Compared with other TDQ cut-off points, 79% of the subjects were accurately classified at a point of 24. The area under the ROC curve was 0.829 (Fig. 1). Using the same method, the optimal BDI cut-off point was 14. At this point, 78% of the subjects were accurately classified. The area under the BDI’s ROC curve was 0.763 (Fig. 1).

In Tables 3 and 4, we present some conventional

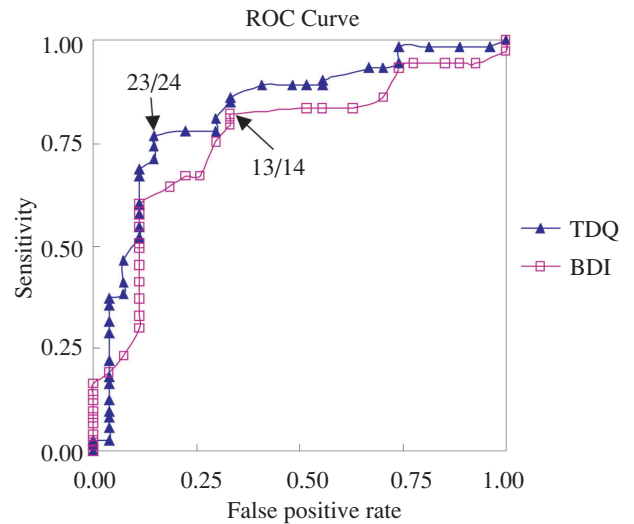


Fig. 1 Receiver operating characteristic curve and optimal cut-off score for Taiwanese Depression Questionnaire and Beck Depression Inventory among patients with chronic pain.

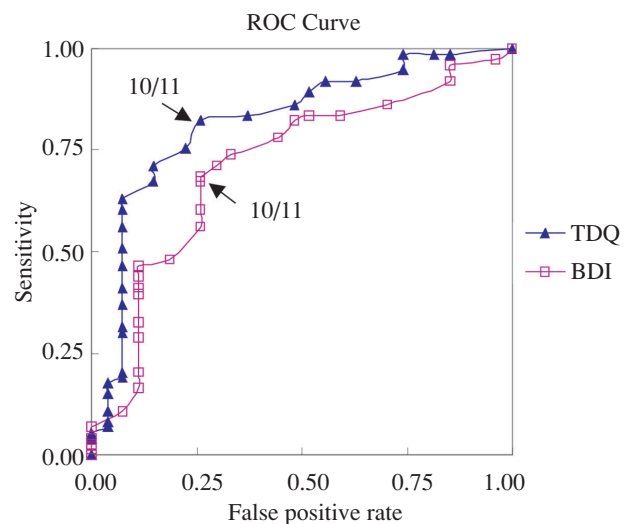


Fig. 2 Receiver operating characteristic curve and optimal cut-off score for cognitive component of Taiwanese Depression Questionnaire and Beck Depression Inventory among patients with chronic pain.

validity indexes for the TDQ and BDI, respectively. Sensitivity, specificity, PPV, NPV, and efficiency of each instrument at a particular cut-off score are presented in Tables 3 and 4. For the TDQ, a cut-off point of 24, obtained using ROC curve analysis, achieved a sensitivity of 76.7%, specificity of 85.2%,

Table 3. Sensitivity, Specificity, and Positive and Negative Predictive Value of the TDQ Total Score

Cut-off score	Sensitivity	Specificity	PPV	NPV	Efficiency
≥ 15	89.0	48.1	82.3	61.9	78.0
≥ 16	89.0	51.9	83.3	63.6	79.0
≥ 17	89.0	59.3	85.5	66.7	81.0
≥ 18	86.3	66.7	87.5	64.3	81.0
≥ 19	84.9	66.7	87.3	62.1	80.0
≥ 20	80.8	70.4	88.1	57.6	78.0
≥ 22	78.1	70.4	87.7	54.3	76.0
≥ 23	78.1	77.8	90.5	56.8	78.0
≥ 24	76.7	85.2	93.3	57.5	79.0
≥ 25	74.0	85.2	93.1	54.8	77.0
≥ 26	71.2	85.2	92.9	52.3	75.0

Abbreviations: PPV: positive predictive value; NPV: negative predictive value.

Table 4. Sensitivity, Specificity, and Positive and Negative Predictive Value of the BDI Total Score

Cut-off score	Sensitivity	Specificity	PPV	NPV	Efficiency
≥ 12	83.6	44.4	80.2	50.0	73.0
≥ 13	83.6	48.1	81.3	52.0	74.0
≥ 14	82.2	66.7	87.0	58.1	78.0
≥ 15	80.8	66.7	86.8	56.3	77.0
≥ 16	79.5	66.7	86.6	54.5	76.0
≥ 17	75.3	70.4	87.3	51.4	74.0
≥ 18	67.1	74.1	87.5	45.5	69.0
≥ 19	67.1	77.8	89.1	46.7	70.0
≥ 20	64.4	81.5	90.4	45.8	69.0
≥ 21	60.3	88.9	93.6	45.3	68.0
≥ 22	57.5	88.9	93.3	43.6	66.0

Abbreviations: PPV: positive predictive value; NPV: negative predictive value.

PPV of 93.3%, NPV of 57.5%, and efficiency of 79%. At the statistically obtained cut-off point of 14 for the BDI, sensitivity was 82.2%, specificity was 66.7%, PPV was 87.0%, NPV was 58.1%, and efficiency was 78%. The data suggest that the validity of both TDQ and BDI is acceptable.

Validity of the cognitive/affective subscales of TDQ and BDI

To examine whether somatic items of TDQ and BDI confound the ability of the rating scales to detect depression in patients with chronic pain, we

performed additional ROC curve analyses of the cognitive/affective subscales of TDQ and BDI. Using factor I of TDQ, the optimal TDQ cut-off point of 11 was under ROC curve analysis. The area under the TDQ ROC curve was 0.821. Eighty percent of subjects were accurately classified at a cut-off point of 11.

The BDI was divided into two subscales: Cognitive/affective (items 1-14) and somatic (items 15-21). The division of the Chinese version of BDI was performed by Shek⁽¹⁹⁾ and is similar to the BDI subscales reported by Beck et al.⁽⁸⁾ Using the items 1-14 on the BDI, an ROC curve analysis was obtained. The optimal BDI cut-off point was 11. The area under the BDI ROC curve was 0.715. Seventy percent of subjects were accurately classified at a cut-off point of 11 (Fig. 2). The results indicated that the validity of both cognitive/affective subscales of TDQ and BDI is acceptable. Further comparisons of validity between the subscales are shown in the following section.

Comparison of the validity of the TDQ and the BDI

To test whether there were any differences between the validity of the TDQ and BDI, we did the following analyses using the method developed by Henley and McNeil.⁽²⁵⁾

1. Comparison of the areas under the ROC curves of the TDQ and the BDI:

The AUC was 0.829 (SE = 0.048) and 0.763 (SE = 0.053) for the TDQ and BDI, respectively. Our analysis showed a trend that the AUC of the TDQ was larger than that of the BDI ($z = 1.737, p = 0.088$) and indicated that the validity of the TDQ might be better than that of the BDI in detecting depression in patients with chronic pain.

2. Comparison of the area under the ROC curves of the cognitive/affective subscales of the TDQ and the BDI:

The AUC of the cognitive/affective subscales 0.821 (SE = 0.050) and 0.715 (SE = 0.059) for the TDQ and BDI, respectively. It showed that the AUC of the cognitive/affective of the TDQ was significantly larger than that of the BDI ($z = 2.55, p = 0.015$), and indicated that the cognitive/affective subscale of the TDQ was the more valid screening tool in detecting depression in patients with chronic pain than that of the BDI.

Comparison of the validity between total and cognitive/affective subscale of TDQ and BDI

To examine whether removing somatic items on the TDQ and BDI would affect their ability to identify depression, we compared the AUC of the TDQ (BDI) and cognitive/affective subscale of the TDQ (BDI) separately. We found that the AUC of the TDQ and its cognitive/affective subscale had no significant difference ($z = 0.41, p = 0.367$); however, the AUC of the BDI was significantly larger than that of its cognitive/affective subscale ($z = 2.57, p = 0.015$). The results suggested that somatic items significantly affected the validity of the BDI, but not of the TDQ, in detecting depression in patients with chronic pain.

DISCUSSION

Both the TDQ and BDI total scales effectively screened for depression in patients with chronic pain and showed satisfactory sensitivity, specificity, positive predictive values, and negative predictive values. Our results showed a trend that the validity of the TDQ was better than that of the BDI ($p = 0.088$), and the validity of the cognitive/affective component of the TDQ was significantly better than that of the BDI ($p = 0.015$).

Since somatic items of the TDQ and BDI might confound the ability of these rating scales to detect depression in patients with chronic pain, we examined the validity of the cognitive/affective component of these rating scales. After removing the somatic items, the validity index for the TDQ and BDI decreased but remained acceptable. However, when we compared the AUC of these two questionnaires and of their cognitive/affective subscale, we found that the removal of the somatic items of the BDI significantly decreased its validity. Our findings about the BDI supports the results of the study by Geisser et al.,⁽¹³⁾ where they found that the somatic symptoms affected identification of depression among patients with chronic pain, and dropping somatic items from the scale slightly decreased the validity of BDI. So far, there have been a few articles published about the validity of BDI in assessing patients with chronic pain for depression.^(13,27,28) Wesley et al found that weight loss, sleep disturbance, and work inhibition failed to differentiate the depressed patients with chronic back pain from the

nondepressed patients with chronic back pain utilizing item analysis, and implicated that the exclusion of the above three items on the BDI significantly improved the diagnostic efficiency. They suggested that subjective depression and somatic disturbance should be evaluated independently to have better validity of the BDI when detecting patients with chronic back pain.⁽²⁷⁾ This finding was not supported by our results that somatic items significantly influenced the BDI's validity. One possible explanation for this discrepancy is the cultural bias problem of the BDI which was elucidated by Zheng et al., for instance, poor construct validity and 'loss of libido' were the most weakly correlated items.⁽¹⁷⁾

Conversely, the validity of the TDQ was not affected after removing the somatic items. This can be accounted for by some reasons. First, the TDQ had good validity in its cognitive/ affective components. Second, some of our subjects had visited psychiatric outpatient clinics before entering this study, and might have more psychologization tendencies but less somatization. These two factors may have resulted in weaker influences of the somatic items of the TDQ on the total TDQ scale. Researchers have found some socio-demographic indicators of somatizers: e.g. female gender, elderly, low socioeconomic status.^(29,30) Mak and Zane reported that somatization might be a stress response with regard to increased distress severity and psychosocial stressors among Chinese Americans.⁽³¹⁾ Hence, there are two factors determining whether somatic items influence the validity of depression questionnaires: (1) Patients' characteristics: somatic complaints from medical illness, and somatization tendency of patients; and (2) The structure of questionnaires: the lower proportion of somatic components in the questionnaire, the less role the somatic items play, i.e. the somatic components of the TDQ had low explanation of variance by factor analysis (7.8%). Since the validity of the TDQ was not affected after removing the somatic items, it can be expected that the TDQ might be more suitable than the BDI in detecting depression in patients with physical illnesses in the field of consultation-liaison psychiatry.

Different inclusion criteria and sample sources may have affected the determination of the cut-off point. For example, included diagnoses in this study were major depressive disorder and some minor forms of depression, such as dysthymic disorder,

depressive disorder not otherwise specified, whereas the study by Geisser et al.⁽¹³⁾ included only those with major depressive disorder. This difference might account for the lower BDI cut-off point in our study than that in Geisser et al. (14 vs. 21). Additionally, the research setting of this study was a medical center, whereas the setting for a previous TDQ validity study was the community.⁽¹⁸⁾ The different sources for the subjects may have contributed to a higher TDQ cut-off point in this study than that in the community study (24 vs. 19).

Certain limitations should be noted when interpreting the data. First, our sample size was relatively small, and may not be representative of the general population. Second, consecutive sampling may have rendered sampling bias and decreased the degree of randomization, thus reduced the strength of interpretation.

In conclusion, both the TDQ and the BDI have good validity for detecting depression among patients with chronic pain. Our results support that the TDQ is a valid screening tool for depression in patients with chronic pain and might be a more valid tool than the BDI. Based on our results, we suggest that patients with chronic pain be assessed using the TDQ for early detection and treatment of depression. However, studies with larger sample sizes and in community settings are required to confirm our findings.

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台灣人憂鬱問卷及貝氏憂鬱量表用在篩檢慢性疼痛患者之憂鬱症的比較

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背景：過去的研究發現憂鬱自填量表在評估時，可能會被疼痛等身體症狀所影響，因而使效度減低。本研究的目的為比較台灣人憂鬱問卷及貝氏憂鬱量表此二自填量表，在篩檢慢性疼痛患者之憂鬱症的效度。

方法：一百名慢性疼痛患者接受台灣人憂鬱問卷、貝氏憂鬱量表、McGill 疼痛問卷，與結構式精神科臨床診斷會談之評估，其中 73 名罹患憂鬱症。計算出台灣人憂鬱問卷及貝氏憂鬱量表之傳統效度指標，並加以比較。

結果：台灣人憂鬱問卷及貝氏憂鬱量表均具有良好的敏感度、特異性、正預估值與負預估值。研究結果發現台灣人憂鬱問卷在效度上有較貝氏憂鬱量表略優的趨勢，在認知/情緒層面的效度上，台灣人憂鬱問卷顯著優於貝氏憂鬱量表。

結論：本研究推論台灣人憂鬱問卷用於慢性疼痛病患憂鬱症之篩檢上，可能較貝氏憂鬱量表為佳。
(長庚醫誌 2008;31:369-77)

關鍵詞：貝氏憂鬱量表，慢性疼痛，台灣人憂鬱問卷，效度

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