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Cognitive Behavioral Therapy in Depressed Cardiac Surgery Patients

Role of Ejection Fraction

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Aims: The aim of this study was to evaluate the relationship of ejection fraction (EF) and depressive symptoms in cardiac surgery patients assigned to nurse-guided cognitive behavioral therapy (CBT) or usual care (UC). **Methods:** Depressive symptoms were assessed using the Beck Depression Inventory (BDI). Seventy-seven patients (31% women; mean [SD] age, 63.6 [9.8] years) received 8 weeks of either CBT or UC. Using repeated-measures analysis of variance, changes in depressive symptoms over time were evaluated. **Results:** There was a significant interaction among time, treatment group, and EF status ($P = 0.019$). In the patients with preserved EF (≥40%), mean BDI scores in the UC group worsened by 1.9%, whereas those in the CBT group improved by 31.0%. In the patients with low EF (<40%), mean BDI scores worsened by 26.8% and improved by 75.3% in the UC and CBT groups, respectively. **Conclusions:** Nurse-guided CBT is effective in reducing depressive symptoms after cardiac surgery, particularly in patients with low EF.

KEY WORDS: cardiac surgery, cognitive behavioral therapy, depressive symptoms, ejection fraction

Background

Depression is common in patients who undergo cardiac surgery, with the reported prevalence ranging from 15% to 38%.[1–6] Moreover, depression has been reported to be an independent predictor of delayed recovery,[2] increased rehospitalization,[4,5] and increased cardiac mortality[2–5] after cardiac surgery. The detrimental effect of depression on mortality is long lasting, as shown in studies that followed patients for 5 to 10 years after cardiac surgery.[1,6,7]

Low ventricular ejection fraction (EF) (ie, <40%–45%) indicates ventricular systolic dysfunction, the most common cause of heart failure.[8] It has been found to be a strong predictor of short-term and long-term mortality after cardiac surgery.[5,7,9] Because both depression and low EF have been identified as predictors of poor outcomes, several researchers have examined the effect of depression on patient outcomes in relation to EF. Analyzing longitudinal data from 883 patients who underwent cardiac surgery, Kendel et al[10] reported that increased depressive symptoms predicted functional decline during 1 year after surgery. Furthermore, they found that the adverse effect of depression on postoperative physical functioning was significantly stronger in patients with low EF than in patients with preserved EF. Similar findings were reported in patients with heart failure. Following 510 patients with heart failure during a 6-year period, Johansson et al[11] reported that depressive symptoms were an independent predictor of cardiovascular mortality and all-cause mortality even after adjustment for age, gender, New York Heart Association class, EF, and B-type natriuretic peptide. Moreover, they found that patients with low EF and depressive symptoms had the highest risk for cardiovascular mortality compared with patients with low EF without depressive symptoms and those who had preserved EF with and without depressive symptoms after adjustment. These findings suggest an additive adverse effect

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of low EF and depression on the outcomes of patients with heart disease.

The most recent guidelines from the American Heart Association and the American Psychiatric Association[12] recommend cognitive behavioral therapy (CBT) as a treatment option for depression in patients with heart disease. A recent Cochrane review[13] concluded that psychological interventions, most of which included CBT strategies, resulted in small to moderate improvements in depression and fewer cardiac deaths among patients with heart disease. In addition, in a recent systematic review of psychological interventions for depression in patients with heart disease, Dickens et al[14] reported that CBT was the only psychological intervention that showed significant effects in high-quality trials and therefore recommended CBT for the treatment of depression in this population. However, there are only a few studies that examined the effect of CBT in cardiac surgery patients.[15–17] These studies showed that 4 to 12 sessions of individual CBT resulted in greater improvements in depressive symptoms and quality of life compared with usual care (UC) or supportive stress management among patients who underwent cardiac surgery.

The efficacy of CBT has been established for depression among patients with heart disease.[13,14] Despite the findings from previous studies demonstrating an additive adverse effect of low EF and depression on the outcomes of patients with heart disease,[10,11] the effect of CBT on depressive symptoms has never been evaluated in relation to EF. Therefore, we conducted a secondary analysis of data from a clinical trial testing the effect of nurse-guided CBT compared with UC on depressive symptoms among patients recovering from cardiac surgery.[17] Specifically, the aim of the present study was to examine whether the effect of CBT on depressive symptoms is different between cardiac surgery patients with low EF (<40%) and those with preserved EF (≥40%).

Methods

This was a secondary analysis of data from a randomized clinical trial of CBT compared with UC in patients recovering from cardiac surgery. The study methods have been described in greater detail elsewhere.[17] The primary study was conducted at 5 tertiary care centers in California and was approved by the institutional review board.

Sample and Procedure

Patients who underwent cardiac surgery (coronary artery bypass grafting or valve replacement/repair) at the participating hospitals were screened for the primary study. Exclusion criteria included younger than 30 years, residing outside the greater Los Angeles area, presence of cognitive impairment or major comorbid psychiatric condition (schizophrenia, bipolar disorder, substance abuse), and current autoimmune disorder or malignancy. Patients who met eligibility criteria and consented to participate were approached after surgery and before hospital discharge. Sociodemographic data were collected using a brief questionnaire. Depressive symptoms were assessed with the Beck Depression Inventory (BDI).[18] Clinical data were collected from medical records. Within a month after hospital discharge, a trained research nurse called the patients at home to reassess depressive symptoms. The patients with BDI scores of greater than 10 at either baseline or 1 month after discharge or those who had a history of depression were interviewed at home by a trained research nurse using the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (SCID-I).[19]

On the basis of the SCID-I interview and after confirmation of depression status by a panel of mental health professionals, 81 participants who met criteria for major or minor depression were randomized to receive either 8 weeks of nurse-guided CBT or UC. At 8 weeks, the presence of clinical depression was reevaluated via the SCID-I by a trained research nurse, who was blinded to the treatment group.

The home-based nurse-guided CBT was conducted by 4 advanced practice nurses with expertise in cardiac and/or psychiatric care. All of them had completed standardized CBT training (Beck Institute, Philadelphia, Pennsylvania). The intervention consisted of 8 weekly sessions of therapy, each of which lasted 50 to 60 minutes. All sessions were conducted one-on-one in person without family members present. Details regarding the intervention and methods used to ensure fidelity and consistency of the intervention have been described elsewhere.[17]

The patients in the UC group received referrals to their primary care providers and mental health services. In addition, they received short biweekly follow-up telephone calls from study staff during an 8-week period. Telephone calls were aimed primarily at maintaining ongoing contact to facilitate patients' retention in the study and did not include assessment of depressive symptoms. A semiscripted outline was used for these telephone calls to ensure consistency.

Instruments

The Charlson Comorbidity Index (CCI) was used to assess the number and severity of medical comorbidities.[20] It is the most extensively studied comorbidity index available.[21]

Depressive symptoms were measured with the BDI, a 21-item self-report questionnaire with 2 subscales assessing cognitive-affective and somatic symptoms.[18] In the current study, the α coefficient of the BDI was 0.87. The cognitive-affective factor includes negative self-view,

depressive mood, anhedonia, pessimism, irritability, suicidal ideation, and indecisiveness; the somatic factor includes somatic items (sleep disturbance, fatigability, change in appetite or weight, loss of libido), together with the items on social withdrawal and work inhibition.[22]

The presence or the absence of clinical depression was determined using the SCID-I. It is a semistructured interview that is widely accepted and has been used as a criterion reference in studies evaluating other questionnaires for the identification of axis I disorders.[19] Criteria for major and minor depression in the SCID-I are consistent with the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*.

Analysis

Data were analyzed with IBM Statistical Package for the Social Sciences 21 (IBM, Armonk, New York, 2012). Baseline characteristics between the patients with low EF (<40%) and preserved EF (≥40%) were compared using χ^2 tests, Student *t* tests, and Mann-Whitney *U* tests, as appropriate. Changes in depressive symptoms over time by treatment group and EF status were evaluated using repeated-measures analysis of variance, controlling for baseline differences between the patients with and without low EF. The models included a fixed time factor; 2 grouping factors (CBT vs UC and low vs preserved EF); the 2-way interaction terms between time and 2 grouping factors; and the 3-way interaction term of time, treatment group, and EF group. Analyses followed intention-to-treat principles, in which baseline scores or last BDI scores were imputed for individuals who were excluded or did not finish 8 weeks of CBT. Similar models were evaluated for the BDI-cognitive/affective and BDI-somatic subscales. The statistical significance level was set at $P < 0.05$. For pairwise comparisons, the Bonferroni method was used to adjust for multiple comparisons.

Results

For the primary study, 45 patients were assigned to the CBT group and 36 patients were assigned to the UC group. Three patients from the CBT group and 1 patient from the UC group had no EF data and therefore were excluded from this analysis. Sixty-four individuals (83%) had preserved EF; 13 (17%) had low EF. Eighty-eight percent of the patients in the CBT group and 77% of the patients in the UC group had preserved EF. There were no significant differences between the patients with low EF and those with preserved EF in age, race/ethnicity, educational level, marital or employment status, type of cardiac surgery, or antidepressant use (Table). No significant differences were found between the patients with and without low EF in their baseline BDI scores ($P = 0.46$), baseline cognitive-affective scores ($P = 0.16$), or somatic subscale scores ($P = 0.70$). However, the patients with low EF had higher scores on the CCI, indicating that they had worse comorbidities compared with the patients with preserved EF ($P = 0.01$). Therefore, CCI scores were controlled for in the following analyses.

The results of the repeated-measures analysis are displayed in Figure. For the total BDI, both patients with and without low EF benefited from CBT, compared with similar patients in the UC group (time by treatment group interaction, $F_{1,71} = 16.66$, $P < 0.001$). There was a significant 3-way interaction effect among time, treatment group, and EF status ($F_{1,71} = 5.78$, $P = 0.019$). In the patients with preserved EF, mean BDI scores in the UC group increased by 1.9% (indicating worsening symptoms; $P = 0.88$), whereas mean BDI scores in the CBT group decreased (indicating symptom improvement) by 31.0% ($P = 0.006$). In the patients with low EF, mean BDI scores worsened by 26.8% ($P = 0.23$) and improved by 75.3% ($P = 0.001$) in the UC and CBT groups, respectively. Similar improvement for the participants who received CBT with and without low EF was noted for the BDI subscales as well. Significant interactions of time by treatment by EF status were observed for the cognitive/affective symptoms ($F_{1,70} = 8.04$, $P = 0.006$) and for somatic symptoms ($F_{1,69} = 4.65$, $P = 0.034$).

Discussion

To our knowledge, this is the first study that examined the effect of CBT on depressive symptoms in relation to EF among cardiac surgery patients. After 8 weeks of home-based nurse-guided CBT, we found a greater effect of CBT on depressive symptoms in the patients with low EF than in the patients with preserved EF. In our sample, the patients with low EF had more comorbidities than those with preserved EF, and therefore, comorbidities were controlled for in the analysis. The 2 groups of patients did not differ in terms of sociodemographic or other baseline clinical characteristics, including baseline depressive symptoms. Therefore, the greater effect of CBT in patients with low EF may not be explained by any of these characteristics of the patients. Because physical symptoms that are common in cardiac patients, such as fatigue, loss of energy, changes in sleep patterns, and changes in appetite, overlap with somatic symptoms of depression,[23] we analyzed cognitive-affective and somatic symptoms of depression separately and found larger improvements for the patients with low EF in both cognitive-affective and somatic symptoms compared with the patients with preserved EF. Therefore, although we did not measure changes in physical symptoms after surgery, the greater effect of CBT in patients with low EF may not be explained by a potential difference in changes in physical symptoms after surgery between patients with and without low EF.

TABLE Demographics by Ejection Fraction Group

	Ejection Fraction		
	Preserved EF (≥40%) (n = 64)	Low EF (<40%) (n = 13)	
	n (%)	n (%)	*P*
Female	20 (31.3%)	5 (38.5%)	0.62
Non-Hispanic white	44 (68.8%)	8 (61.5%)	0.61
Higher than high school education	47 (74.6%)	11 (84.6%)	0.44
Married or cohabitating	47 (73.4%)	7 (53.8%)	0.16
Employed	23 (35.9%)	4 (30.8%)	0.72
Nonelective surgery[a]	25 (39.7%)	9 (69.2%)	0.05
Type of surgery			
CABG	41 (64.1%)	11 (84.6%)	0.49
AVR	11 (17.2%)	1 (7.7%)	
MVR	5 (7.8%)	0	
CABG and AVR/MVR	7 (10.9%)	1 (7.7%)	
Postoperative complications (yes)	33 (53.2%)	7 (58.3%)	0.75
Type of depression: baseline			
Major	50 (78.1%)	10 (76.9%)	0.92
Minor	14 (21.9%)	3 (23.1%)	
History of depression	21 (32.8%)	5 (38.5%)	0.70
On antidepressants	24 (37.5%)	4 (30.8%)	0.65
Past smoker	34 (54.0%)	9 (69.2%)	0.31
	Mean (SD)	Mean (SD)	*P*
Age, y	63.0 (9.8)	61.8 (10.3)	0.47
Body mass index, kg/m^2	31.0 (9.6)	29.4 (6.3)	0.57
Charlson Comorbidity Index total score	3.6 (1.9)	5.3 (3.0)	**0.01**
Hospital length of stay, d	9.1 (5.5)	10.9 (5.9)	0.29
Mini–Mental State Examination total score	27.5 (0.8)	27.5 (1.0)	0.93
No. grafts	2.2 (1.4)	2.4 (1.2)	0.70
Pump time, min	100.4 (56.3)	97.7 (54.7)	0.87
Cross-clamp time, min	76.9 (55.8)	71.5 (40.3)	0.75
Baseline total BDI score	15.8 (9.2)	17.8 (9.1)	0.46
Cognitive-affective subscale score	6.6 (6.0)	9.2 (6.4)	0.16
Somatic subscale score	8.1 (4.1)	8.6 (4.6)	0.70

P value in bold indicates a significant difference between the two groups at alpha = 05.
Abbreviations: AVR, aortic valve replacement/repair; CABG, coronary artery bypass grafting; MVR, mitral valve replacement/repair.
[a]Nonelective surgery: urgent (≤48 hours of catheterization) or emergent (≤ 24 hours of catheterization).

Although the mechanism of the greater effect of CBT in patients with low EF than in patients with preserved EF is yet to be determined in future research, this preliminary finding is particularly noteworthy in view of the results from previous studies suggesting that cardiac patients with low EF and depressive symptoms are

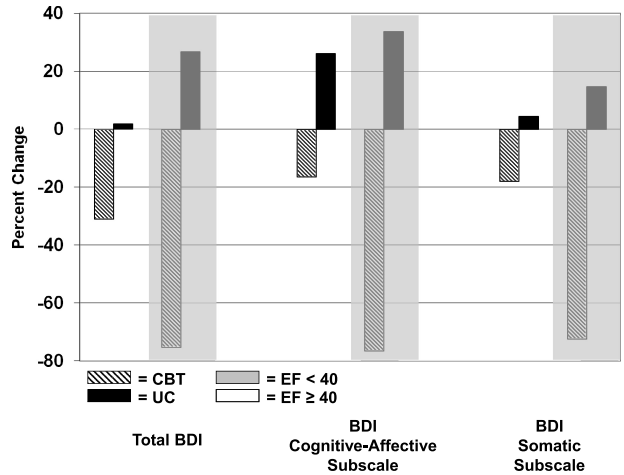

FIGURE. *Differences in the Beck Depression Inventory and subscale scores by treatment group and ejection fraction status, controlling for comorbidities.*

What's New and Important

- Nurse-guided CBT was effective in reducing depressive symptoms after cardiac surgery and was particularly effective in patients with low EF.
- Larger improvements were found for patients with low EF in both cognitive-affective and somatic symptoms of depression compared with patients with preserved EF.
- Depressed patients with low EF should be referred for further assessment and possible CBT.

at particularly high risk for adverse outcomes.[10,11] Following 883 cardiac surgery patients for 1 year, Kendel et al[10] found a moderating effect of EF on the relationship between depressive symptoms and physical functioning. Although increased depressive symptoms predicted a decline in physical functioning after cardiac surgery, the effect of depression on postoperative physical functioning was greater in patients with low EF than in patients with preserved EF. In a study of 510 patients with heart failure, Johansson et al[11] reported that patients with low EF and depressive symptoms had the highest risk for cardiovascular mortality compared with patients with low EF without depressive symptoms and patients with preserved EF with and without depressive symptoms, controlling for other risk factors. Moreover, results from the study by Horne et al[24] suggest that cardiac surgery patients with low EF are susceptible to persistent depression if proper treatment is not provided. In this study with 436 patients undergoing cardiac surgery, the investigators reported that, among the patients who were depressed preoperatively, the patients with low EF were more likely to remain depressed after surgery than the patients with preserved EF. On the basis of these findings and our results demonstrating a greater effect of CBT on depressive symptoms in patients with low EF, treating depression with CBT may also contribute to preventing or minimizing adverse outcomes after cardiac surgery and may be especially beneficial for patients with low EF.

Cognitive behavioral therapy is one of the frequently used psychological interventions to treat depressive symptoms in patients with heart disease.[14] Although there are only a limited number of studies on the effect of CBT in cardiac surgery patients,[15–17] CBT has been reported to be safe and equally effective to antidepressants in reducing depressive symptoms in medical patients.[25,26] Cognitive behavioral therapy has also been shown to produce longer-lasting improvement with low relapse rates than antidepressants and to enhance the efficacy of antidepressants in combination treatment.[27] Given the substantial evidence supporting the adverse effect of depression on short-term and long-term outcomes of cardiac surgery patients, such as recovery and survival after surgery,[1–7] patients undergoing cardiac surgery need screening and treatment of depression. Although further research is needed to replicate these results, our findings provide preliminary evidence that nurse-led CBT may be an efficacious treatment of depressed patients after cardiac surgery, especially for those with low EF.

A few limitations of the present study should be noted. First, because of its small sample size, the generalizability of the findings from this study is limited. Therefore, larger clinical trials of CBT in cardiac surgery patients are needed to confirm these findings. Especially, the findings need to be replicated in studies with a larger number of patients with low EF to establish the clinical significance of the observed greater effect of CBT in patients with low EF. Second, we measured depressive symptoms at baseline and the end of 8 weeks. Therefore, the long-term effect of CBT on depressive symptoms in patients with and without low EF needs to be determined in future research with a longer period of follow-up. In addition, additional outcomes, including physical functioning and mortality, need to be assessed to determine whether the greater improvement in depressive symptoms among patients with low EF after CBT leads to improvement in these outcomes.

Conclusions

The present study provides evidence that nurse-guided CBT is effective in reducing depressive symptoms after cardiac surgery and is particularly effective in patients with low EF. Although larger clinical trials are needed to confirm our findings, we suggest that patients undergoing cardiac surgery should be screened and treated for depression and that nurse-led CBT may be considered as a treatment option for depressed patients, particularly those with low EF, after cardiac surgery.

REFERENCES

1. Borowicz L Jr, Royall R, Grega M, et al. Depression and cardiac morbidity 5 years after coronary artery bypass surgery. *Psychosomatics*. 2002;43(6):464–471.
2. Burg MM, Benedetto MC, Rosenberg R, Soufer R. Presurgical depression predicts medical morbidity 6 months after coronary artery bypass graft surgery. *Psychosom Med*. 2003;65(1):111–118.
3. Baker RA, Andrew MJ, Schrader G, Knight JL. Preoperative depression and mortality in coronary artery bypass surgery: preliminary findings. *ANZ J Surg*. 2001;71(3):139–142.
4. Tully PJ, Baker RA, Turnbull D, Winefield H. The role of depression and anxiety symptoms in hospital readmissions after cardiac surgery. *J Behav Med*. 2008;31(4):281–290.
5. Connerney I, Shapiro PA, McLaughlin JS, Bagiella E, Sloan RP. Relation between depression after coronary artery bypass surgery and 12-month outcome: a prospective study. *Lancet*. 2001;358(9295):1766–1771.
6. Blumenthal JA, Lett HS, Babyak MA, et al. Depression as a risk factor for mortality after coronary artery bypass surgery. *Lancet*. 2003;362(9384):604–609.

7. Connerney I, Sloan RP, Shapiro PA, Bagiella E, Seckman C. Depression is associated with increased mortality 10 years after coronary artery bypass surgery. *Psychosom Med*. 2010; 72(9):874–881.
8. Wang TJ, Levy D, Benjamin EJ, Vasan RS. The epidemiology of "asymptomatic" left ventricular systolic dysfunction: implications for screening. *Ann Intern Med*. 2003;138(11):907–916.
9. Hamad MA, van Straten AH, Schonberger JP, et al. Preoperative ejection fraction as a predictor of survival after coronary artery bypass grafting: Comparison with a matched general population. *J Cardiothorac Surg*. 2010;5:29.
10. Kendel F, Gelbrich G, Wirtz M, et al. Predictive relationship between depression and physical functioning after coronary surgery. *Arch Intern Med*. 2010;170(19):1717–1721.
11. Johansson P, Dahlstrom U, Alehagen U. Depressive symptoms and six-year cardiovascular mortality in elderly patients with and without heart failure. *Scand Cardiovasc J*. 2007; 41(5):299–307.
12. Lichtman JH, Bigger JT Jr, Blumenthal JA, et al. Depression and coronary heart disease: recommendations for screening, referral, and treatment: a science advisory from the American Heart Association Prevention Committee of the Council on Cardiovascular Nursing, Council on Clinical Cardiology, Council on Epidemiology and Prevention, and Interdisciplinary Council on Quality of Care and Outcomes Research: endorsed by the American Psychiatric Association. *Circulation*. 2008;118(17):1768–1775.
13. Whalley B, Rees K, Davies P, et al. Psychological interventions for coronary heart disease. *Cochrane Database Syst Rev*. 2011;(8):CD002902.
14. Dickens C, Cherrington A, Adeyemi I, et al. Characteristics of psychological interventions that improve depression in people with coronary heart disease: a systematic review and meta-regression. *Psychosom Med*. 2013;75(2):211–221.
15. Freedland KE, Skala JA, Carney RM, et al. Treatment of depression after coronary artery bypass surgery: a randomized controlled trial. *Arch Gen Psychiatry*. 2009;66(4):387–396.
16. Dao TK, Youssef NA, Armsworth M, et al. Randomized controlled trial of brief cognitive behavioral intervention for depression and anxiety symptoms preoperatively in patients undergoing coronary artery bypass graft surgery. *J Thorac Cardiovasc Surg*. 2011;142(3):e109–e115.
17. Doering LV, Chen B, Cross Bodan R, et al. Early cognitive behavioral therapy for depression after cardiac surgery. *J Cardiovasc Nurs*. 2013;28(4):370–379.
18. Beck AT, Steer RA, Carbin MG. Psychometric properties of the Beck Depression inventory: twenty-five years of evaluation. *Clin Psychol Rev*. 1988;8(1):77–100.
19. Segal DL, Hersen M, Van Hasselt VB. Reliability of the Structured Clinical Interview for *DSM-III-R*: an evaluative review. *Compr Psychiatry*. 1994;35(4):316–327.
20. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis*. 1987; 40(5):373–383.
21. De Groot V, Beckerman H, Lankhorst GJ, Bouter LM. How to measure comorbidity. A critical review of available methods. *J Clin Epidemiol*. 2003;56(3):221–229.
22. Schotte CKW, Maes M, Cluydts R, De Doncker D, Cosyns P. Construct validity of the Beck Depression Inventory in a depressive population. *J Affect Disord*. 1997;46(2):115–125.
23. Hoen PW, Whooley MA, Martens EJ, et al. Differential associations between specific depressive symptoms and cardiovascular prognosis in patients with stable coronary heart disease. *J Am Coll Cardiol*. 2010;56(11):838–844.
24. Horne D, Kehler S, Kaoukis G, et al. Depression before and after cardiac surgery: do all patients respond the same? *J Thorac Cardiovasc Surg*. 2013;145(5):1400–1406.
25. DeRubeis RJ, Gelfand LA, Tang TZ, Simons AD. Medications versus cognitive behavior therapy for severely depressed outpatients: mega-analysis of four randomized comparisons. *Am J Psychiatry*. 1999;156(7):1007–1013.
26. De Maat S, Dekker J, Schoevers R, De Jonghe F. Relative efficacy of psychotherapy and pharmacotherapy in the treatment of depression: a meta-analysis. *Psychother Res*. 2006; 16(5):566–578.
27. Sartorius N, Baghai TC, Baldwin DS, et al. Antidepressant medications and other treatments of depressive disorders: a CINP Task Force report based on a review of evidence. *Int J Neuropsychopharmacol*. 2007;10(Suppl 1):S1–S207.