Coping, Distress, and Survival Among Patients With Lung Cancer

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Background: This study addresses the question of whether coping and emotional state are predictors of survival among patients with lung cancer. The hypotheses were (1) active coping is linked with longer survival time and (2) depressive coping, emotional distress, and depression are linked with shorter survival.

Methods: The study was based on a sample of 103 patients who were investigated after their diagnosis and before the beginning of primary treatment. The psychological variables were assessed by means of self-reports and interviewer ratings. After follow-up of 7 to 8 years, 92 patients had died; survival data were censored for the remaining 11 patients. The prediction of the survival time was performed by the Cox regression, while adjusting for biomedical risk factors (tumor stage, histological classification, and Karnofsky performance status).

Results: The self-reported depressive coping ($P = .007$) and the interviewer-rated emotional distress ($P = .04$) were significantly associated with shorter survival, independent of the influence of the biomedical prognostic factors.

Conclusions: Both coping and emotional distress had a statistically independent effect on survival among patients with lung cancer. However, the naturalistic design of the study does not allow for any causal interpretation. Thus, the nature of this relationship warrants further investigation.

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Coping and affective state among patients with lung cancer, while controlling for biomedical prognostic factors. Assessments were performed before patients began treatment. The hypotheses that guided the study were that active coping is linked with longer survival, and that depressive coping, emotional distress, and depression are linked with shorter survival.

RESULTS

DEMOGRAPHIC AND BIOMEDICAL DATA

The mean (SD) age of the participants was 59 (9) years (range, 32-84 years). Eight-three percent were men. Age
not seem to influence the results, because there were no significant differences of survival time among the patients judged by the different interviewers, and the effects were even reproduced when the 7 patients who were rated by the biased interviewer were excluded.

Emotional distress was measured by a newly developed scale consisting of the following 5 items: I am anxious, I am depressed, I am distressed by the disease, I am distressed by the diagnostic tests, and I am nervous. Respondents were asked to rate themselves on 5-point scales ranging from 1 (not at all) to 5 (very much). The sum scores of the scale were divided by the number of items, so that the scores had values between 1 and 5. The outside estimates given by the interviewers were performed using analogous statements (eg, the patient is anxious, etc.). Cronbach α values were 0.82 (self-report) and 0.87 (interviewer rating). Interrater reliability (Spearman p) was 0.70. Validation data of this clinical scale have been presented elsewhere.53,56

The degree of depression was measured by means of the well-established Depression Scale D-S.57 It was designed to assess the intensity of depressive, anxious, and irritable or dysphoric mood rather than the nosological entity of depression (sample items: I feel depressed and melancholic. Often I feel miserable. Recently I have been very anxious and nervous.). It can be used to evaluate both healthy persons and psychiatric patients. Each of the 16 items is rated on a 4-point scale from 0 to 3, yielding a total possible depression score ranging from 0 to 48.

Unfortunately, there is no validated German version of any internationally accepted instrument for the assessment of coping. As for depression, German versions of both the Beck Depression Inventory and the Hospital Anxiety and Depression Scale have become available in the meantime. However, these instruments were published in 1993 and 1995, respectively, after the assessments in our study had been completed. The following biomedical variables, which were routinely collected by the study hospital, were taken into account: histological cell type, tumor stage, and Karnofsky performance status.59 The Karnofsky performance status is a clinician’s appraisal of the level of patient’s functioning.

and sex composition corresponded with the data given in the literature.66 Seventy-nine percent were married. For 84% of the patients, the highest level of education was middle school. The respondents were employed as unskilled workers (23%), skilled workers (22%), and middle-level salaried employees (40%). Of these, 33% had already retired by the time of investigation. Histological classifications were as follows: small cell (n = 48), squamous cell (n = 30), adenocarcinoma (n = 17), large cell (n = 4), mixed (n = 4). One patient was stage I, 8 were stage II, 21 were stage IIIa, 30 were stage IIIb, and 43 were stage IV. As expected from the sampling criteria, patients with small cell carcinoma and those with advanced-stage disease were overrepresented. This fact is reflected in the frequencies of treatments: the majority of patients received chemotherapy (n = 15), radiotherapy (n = 14), or both (n = 44). Thirty patients were treated surgically. Of the surgical patients, 14 received additional radiation, 2 received chemotherapy, and 2 received both. Histological classification, tumor stage, and type of treatment were interrelated. Only 1 patient with small cell tumor was given surgical treatment. Patients with non–small cell lung cancer were more frequently operated on when their tumors were in earlier stages. The respective figures were: stage I/II, 100%; stage IIIa, 73%; stage IIIb, 56%; and stage IV, 17%. The mean (SD) score on the Karnofsky performance scale was 82 (13) (median, 80).

INTERCORRELATIONS OF PSYCHOLOGICAL AND BIOMEDICAL VARIABLES

Table 1 shows that self-reports and interviewer ratings of a specific construct were correlated. Different indicators of depressive mood (depressive coping, emotional distress, and depression) were interrelated, whereas active coping was independent of these. There were no effects of age and tumor stage on psychological variables. The Karnofsky performance status was correlated with active coping, as judged by the interviewers, and, inversely, depression. Physician ratings were on the whole

STATISTICAL PROCEDURES

The outcome variable was time from diagnosis to death. Survival times are often censored data. Here the term “censored” means that the total survival time is only known for patients who have already died. For patients who are still alive, the only available information is on the length of survival from the time of diagnosis to the last point of observation. In the present sample, 92 patients were deceased and 11 were censored. With these kind of data, the probabilities of survival can be computed with the method of Kaplan and Meier.59 The statistical comparison of the probabilities was performed using the log-rank test. For the Kaplan-Meier analysis, the continuous variables were dichotomized at the median. We first tested the individual effects of the psychological and biomedical variables on survival. Then the Cox proportional hazards regression model60,61 was used to determine the relationship between psychological variables and survival adjusted for multiple covariates. Biomedical and psychological variables that proved significant in the bivariate tests were simultaneously entered into the Cox regression. To examine whether the association between independent variables and survival is influenced by the levels of interrelated variables, we included the terms describing the interaction of independent variables. Furthermore, we ensured that the included variables satisfied the assumptions of the Cox model by modeling them as binary variables (median split). Stage was split in the following manner: stages I, II, IIIa vs IIIb, and IV. The testing for proportional hazards functions was done with empiric log(-log)-plots and with the acceleration test of Breslow.62 P < .05 was considered significant, and all P values reflect 2-tailed tests. The statistical analyses were performed using SPSS 8.0 for Windows (SPSS Inc, Chicago, Ill).
The biomedical predictors that were related with survival time were tumor stage (P = .002), Karnofsky performance status (P < .001), and histological cell type, ie, small cell vs non–small cell tumors (P = .01). In addition, physicians’ ratings of the severity of the disease were predictive of shorter survival (P = .02), and a tendency was also revealed in their judgments of an unfavorable prognosis (P = .07). However, their estimates of expected treatment success (P = .54), age (P = .72), and sex (P = .91) were not significant predictors.

**COX REGRESSION USING MULTIPLE COVARIATES**

Psychological and biomedical variables that showed a significant effect on survival in the bivariate analyses were entered into the Cox proportional hazards regression model. Thus, included among the psychological variables were both the self-report of depressive coping and the interviewer rating of emotional distress. The effect of an interaction between these 2 variables was also examined. Of the biomedical variables, tumor stage and Karnofsky performance status were taken into account. **Table 3** shows that the tumor stage, the Karnofsky performance status, the self-report of depressive coping, and the interviewer rating of emotional distress were independent predictors of survival.

When cell type and its interaction with tumor stage were included in the multivariate model, the self-report of depressive coping (P = .006), the interviewer rating of emotional distress, and most of the psychological variables were no longer significant predictors of survival.
emotional distress (P = .02), and the Karnofsky performance status (P < .001) remained significant. However, both tumor stage and cell type were no longer significant as single variables, but their interaction proved to have an effect on survival (P = .01).

The physician rating of the severity of the disease was not entered into the Cox regression during the first step because to do so would have unduly restricted the model’s statistical power (sample size, n = 78). However, when the physician rating was included in the model, it showed no independent effect on survival (P = .44). Yet the predictive effects of the tumor stage (P = .02), the Karnofsky performance status (P = .001), the self-report of depressive coping (P = .04), and the interviewer rating of emotional distress (P = .04) remained significant.

To test the suggestion that patients who showed depressive coping or were emotionally distressed might prematurely discontinue chemotherapy, we correlated the number of chemotherapy cycles that part of the patients later received with the coping measures, and found a significant negative correlation with the self-report of depressive coping (r = −0.27, P = .04), but not with the interviewer rating of emotional distress (r = −0.14, P = .30). However, when the number of cycles was included in the Cox model (n = 57), the interviewer rating of emotional distress remained significant (P = .04), while the number of cycles proved nonsignificant (P = .63). In this subgroup analysis, the self-report of depressive coping only revealed a trend (P = .12), as did both the tumor stage (P = .12) and the Karnofsky performance status (P = .06), probably reflecting reduced statistical power that comes from the smaller sample size.

**COMMENT**

In this study, both self-reported depressive coping and interviewer-rated emotional distress were independently associated with shorter survival among patients with lung cancer. Adjusting for biomedical risk factors, these effects remained significant.

There are several strengths to the study. The study was prospective and guided by hypotheses. It started before the commencement of treatment and thereby guaranteed that the psychological measures that were assessed at that time were not influenced by prior treatment. However, the possibility cannot be excluded that psychological variables were indicators of the course of the disease prior to the time of assessment. Since many patients had late-stage cancers, they possibly had some time to develop coping strategies and emotional distress before the assessments were performed. In addition, the physicians’ opinions could have been conveyed to them and might have influenced their emotional state. Furthermore, we cannot rule out the possibility that the links we found were produced by some unknown intervening variables. A major limitation in our study stems from the relatively small size and the selectivity of the sample, in which advanced stages and small cell tumors were overrepresented. Moreover, the study only reports cross-sectional data regarding psychological variables.

Our findings concur with those of other studies that suggest that both emotional distress and depressive coping predict shorter survival. The link determined between the interviewer ratings and survival may reflect a crucial issue: the raters may have based their judgments on their perceptions of the physical state of the patient. However, the self-reports of depressive coping were predictive as well. The degree of distress may be influenced by such coping attitudes as denial or stoicism. The prognostic significance of both the tumor stage and the Karnofsky performance status was confirmed in our sample.

Several models for the relationship between coping and the course of cancer can be conceptualized. The course of the disease may have some impact on coping, either in a direct manner via psychologically active paraneoplastic hormones or in a more indirect manner through the emotional reaction of the patients to bodily symptoms. The physical damage is sometimes reflected better by psychological variables, which are closer to the patients’ experience than the cruder biomedical staging classifications. Thus, several studies have shown quality of life to be an independent predictor of survival in patients with lung cancer and other cancers.

Coping may influence the course of the disease, either in a direct manner via psychoneuroimmunological mechanisms (eg, active coping might increase and depressive coping decrease natural killer cell activity) or in an indirect manner via compliance, such as when patients who cope actively might receive a higher amount of chemotherapy whereas those who are depressed might discontinue such therapy earlier.

To conclude, the present study revealed some evidence pointing to a relationship between coping, distress, and survival among patients with lung cancer, after controlling for biomedical risk factors.

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