

weaker lymphocyte response to the primary tumour, higher autonomic arousal in conjunction with lower self-report of perturbation, and greater disease progression when controlling for known prognostic indicators.^{3,4}

Perhaps the investigators' more grievous error, however, is their claim: "Although suppression of negative emotions has been suggested as a focal characteristic of the type C cancer-prone personality (*sic*), we could find no evidence that this tendency has any effect on survival in this group." The way in which the investigators assessed suppression of negative emotions was by asking participants to rate on a scale the way they generally react. This is not, however, how I have assessed type C in my studies. I have argued^{4,5} that type C cannot be assessed accurately by self-report questionnaires, which assume that people are fully aware of their emotions and how they handle them. This notion is contraindicated by my research that shows that the type C coping style involves a discrepancy between the conscious experience and self-report of emotion, and physiological evidence of emotion or stress.

Because Watson and colleagues did not assess the type C coping style, they have no basis to assert, as is apparently the case concerning their own concept of fighting spirit, that there is no evidence that type C coping influences cancer survival. All they can conclude legitimately is that emotional control, as assessed by their self-report measure, was not associated with cancer outcomes.

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- 2 Temoshok L, Sagebiel RW, Blois MS, et al. The relationship of psychosocial factors to prognostic indicators in cutaneous malignant melanoma. *J Psychosom Res* 1985; **29**: 139-53.
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Authors' reply

Sir—R C F Leonard asserts that our report will be cited as showing an important interaction between psychological attitude and outcome in early-stage breast cancer. However, our paper is equally important in what it fails to prove—namely, that a fighting spirit improves survival. The other point Leonard raises is about knowledge of the extent of disease at the time of answering the baseline questionnaire, but this point is not relevant because the study was restricted to women with early-stage disease. However, patients might be aware of the factors linked to prognosis in early-stage disease. If this were so, one might expect baseline psychological response to be affected.

We analysed baseline psychological response in association with known clinical prognostic factors but showed that there was no significant association. Knowledge of clinical prognostic factors could not explain the association we discovered between psychological response and survival. Even if there were weak associations between baseline psychological response and the clinical factors, we have adjusted for these in the survival analysis.

Judith Petry raises a point about the limitations of a questionnaire methodology. We agree that "the human response to illness is as varied and complex as that of any other life challenge". We do not claim to measure all these varied responses and agree with her that it might be impossible to do so with a questionnaire. However, our study does show a modest effect on survival for a questionnaire measure of a helpless/hopeless attitude, and this merits further investigation.

Lydia Temoshok's comments suggest that she is under the misconception that we have tried to replicate some of her findings and she takes us to task for not using the correct methodology. Our aim was not to confirm her findings, but to test the notion that the putative type C cancer-prone personality, previously described by us,^{1,2} might be linked to breast cancer survival. We define type C behaviour differently, with emotional control being the central element.

Finally, it is vital that scientific truth is based on replication. We judge it entirely appropriate that others should now seek to replicate our results and encourage them to do so.

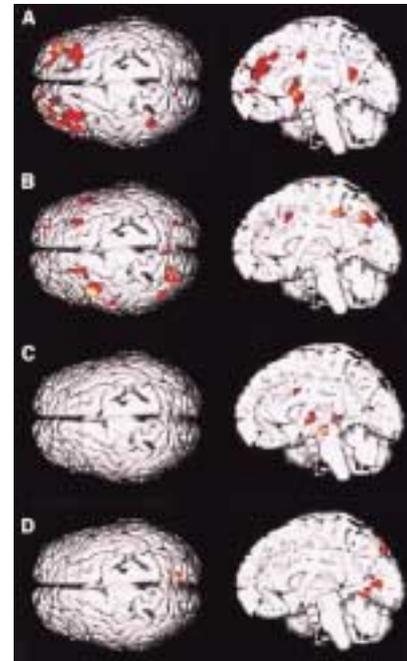
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- 1 Pettingale KW, Watson M, Greer S. The validity of emotional control as a trait in breast cancer patients. *J Psychosoc Oncol* 1984; **2**: 21-30.
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Sir—Because of advances in psychoneuroimmunology,¹ many investigators will not be satisfied by the simple study by M Watson and colleagues,² in which the association between psychological factors and disease outcome is assessed. It is now understood that psychological factors may determine immune function via abnormal functions of hypothalamic-pituitary-adrenal axis and autonomic nervous system. Interpretation of Watson and colleagues' results is not easy because there seems to be a missing link between the psychological (depression) and biological (survival) dimensions. The findings need to be reinterpreted in the context of an interaction between the mind, brain, and body.

In a preliminary study,³ we assessed influences of psychological factors on the regional cerebral glucose metabolism of patients with cancer by positron emission tomography (PET). PET with 18-fluorodeoxyglucose was done on 21 patients with cancer, but without brain metastases, and ten controls, and their brain images were compared. The 21 patients were



PET scan showing areas of metabolic reduction in brains of patients with cancer

Summary images of areas of metabolic reduction in brain of 21 cancer patients (A); in patients with high scores on depression scale (B); in patients with remaining tumours (C); and patients who had had chemotherapy (D).