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Cellular and humoral immunity, mood and exam stress: the influences of self-hypnosis and personality predictors

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Abstract

The effects of self-hypnosis training on immune function and mood were examined in medical students at exam time. Hypnosis involved relaxation and imagery directed at improved immune function and increased energy, alertness and concentration. Hypotheses were made about activated and withdrawn personality differences. Eight high and eight low hypnotically susceptible participants were given 10 sessions of hypnosis, one live and nine tape-recorded, and were compared with control subjects ($N = 12$). CD3, CD4, CD8, CD19 and CD56 NK cells and blood cortisol were assayed. Life-style, activated vs. withdrawn temperament, arousal and anxiety questionnaires were administered. Self-hypnosis buffered the decline found in controls in NK ($P < 0.002$) and CD8 cells ($P < 0.007$) and CD8/CD4% ($P < 0.06$) (45–35% order of magnitude differences) while there was an increase in cortisol ($P < 0.05$). The change in NK cell counts correlated positively with changes in both CD8 cells and cortisol. Results were independent of changes in life-style. Energy ratings were higher after hypnosis ($P < 0.01$), and increased calmness with hypnosis correlated with an increase in CD4 counts ($P < 0.01$). The activated temperament, notably the cognitive subscale (speaking and thinking quickly), was predictive of exam levels of T and B lymphocytes ($P \ll 0.08 - P < 0.02$), and reaching $r = 0.72$ ($P < 0.001$) in the non-intervention control group. The sizeable influences on cell-mediated immunity achieved by a relatively brief, low cost psychological intervention in the face of a compelling, but routine, stress in young, healthy adults have implications for illness prevention and for patients with compromised immunity. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Self-hypnosis; Natural killer cells; T-lymphocytes; B-lymphocytes; Laterality; Mood; Personality; PSQ; Stress

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1. Introduction

While the main focus of research in the field of immunology has been devoted to basic neuroscience, the influence of psychological factors is both undeniable and under researched (Ader et al., 1991; Leonard and Miller, 1995; Evans et al., 2000; Gruzelier, 2001). Few studies have assessed the prophylactic benefits of psychological interventions, particularly with healthy individuals facing stressful life events that threaten immunity. If efficacy could be demonstrated it would have important implications for improving well-being and preventing illness in healthy but vulnerable individuals such as the elderly, quite apart from applications with patients with compromised immune systems.

In a controlled study Kiecolt-Glaser et al. (1986) randomly assigned 34 medical students 4 weeks before exams to relaxation training with hypnosis or to a control group with no intervention. The intervention consisted of 3 weeks of relaxation training involving five group sessions of self-hypnosis, progressive relaxation, autogenic training and imagery exercises, a menu from which students could self-select in order to practise at home prior to exams. Peripheral blood lymphocytes (CD4, CD8 and CD4/CD8 ratios) and natural killer cells were examined before training and during exams. Immunosuppression accompanied the stress of exams, as has now been widely documented (Kiecolt-Glaser et al., 1984; Glaser et al., 1985; Halvorsen and Vassend, 1987; Gilbert et al., 1996; Deinzer and Schuller, 1998). While there was less reported distress following the psychological intervention there was no beneficial effect on immune function. The outcome of the study may have been compromised by the fact that, exam stress aside, baseline levels of immune parameters were extremely low, suggestive of immune suppression due to the stress of adaptation to a medical school new to them. However, post hoc analysis of percentages of CD4 helper/inducer T cells disclosed a significant correlation with the number of home practice sessions; there was no correlation with CD 8 cell%, the CD4/CD8 ratio, or with NK cell activity. As the frequency of relaxation sessions, which ranged

between five and 50 sessions with a mean of 12.07, was left to the students' initiative, the relation with CD4 cells may have reflected the influence on immune function of a motivational factor linked with personality. Yet placed in the context of a controlled investigation with the elderly, where improvements in immune function have been more clearly associated with relaxation training (Kiecolt-Glaser et al., 1985), the student study was deserving of constructive replication. It was also the case that Whitehouse et al. (1996) examined first year medical students for the efficacy of stress intervention. They administered self-hypnosis/relaxation training with 21 students over 19 weeks from the beginning of the academic year with four evaluations: during orientation, late semester, the examination period, and concluding with a post semester recovery assessment. Aside from home practice, which they were requested to do daily for 15 min, students were given weekly, 90 min, group training sessions aimed at practising relaxation and discussing their experiences. They were in medium and high susceptibility ranges as assessed by the Harvard Group Scale of Hypnotic Susceptibility and the Inventory of Self-Hypnosis. Whereas the exam period saw higher ratings of total mood disturbance, fatigue, loss of vigour, hostility, depression and obsessive-compulsive symptoms, relaxation training preferentially lowered anxiety and distress compared with 14 control students. However, there were no differences in immune function when comparing the relaxation and control groups, an outcome similar to the Kiecolt-Glaser study. However, unlike the previous study the exam period was accompanied by an up-regulation of immune function, aspects of which in the form of NK cell activity and cell number were predicted by ratings of the quality of the self hypnosis relaxation exercises. Frequency of practice was unrelated to immune changes.

As with the Kiecolt-Glaser's study, the use of first year students may have reduced the chances of more demonstrable benefits of the psychological intervention. There was evidence on some scales of distress peaking at orientation, or to be as high at orientation as at exam time, or to be high throughout the semester until a fall during

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