

The Role of Stress in Immunity and Disease – Dr Guy Parr



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Curriculum vitae

Guy Parr studied at UCT where he obtained BSc (Med) in 1970 and MBChB in 1973. After internship at Groote Schuur Hospital, he spent 2 years in Europe, with various GP-locums in London. He returned to the RSA and after being a Medical Registrar at Groote Schuur (1977-1978) he started as a GP in Claremont. He is interested in academic medicine, family therapy and holistic medicine. Guy is married with 3 children, and when he has free time he loves sailing and running.

Summary

The traditional, western biomechanical model of disease is no longer considered adequate for the responsibilities of comprehensive medicine today. Recent advances in immunology have indicated strong links between emotional stress, immune-competence and disease. Several studies suggest convincingly the role of stress in the onset of infections and malignancies. This progress is significant for the family practitioner in his holistic assessment of disease and the multifactorial aetiology of illness in the patient and his family.

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“Mrs Emerson, upon the death of her daughter underwent great affliction, and perceived her breast to swell . . . it broke out in a most inveterate cancer . . . she had always enjoyed a perfect state of health.

(Gendron: Enquiries into the nature, knowledge and cure of cancers. 1701)

The traditional western biomechanical model of disease has its origins in the fifteenth century. As a concession to the demands of developing modern science, the church decreed that scientific investigation of the human body by the medical profession was permissible but the soul (mind) was strictly the preserve of the church. This led to a mechanical model that defined disease in terms of somatic parameters and was not concerned

with problems of living, psychosocial issues, or mental illness.¹ This reductionist view was based on the single primary principle of mind-body dualism, the body being conceptualised as a machine functioning independently of the mind. This has become the culturally accepted dominant “folk model” of disease in the west. It has acquired the status of dogma in some medical disciplines, to the extent that unverifiable observations have been disregarded as anecdotal and irrelevant.¹

Although modern science is now based on relativity and systems theory, conventional medicine with its specialist orientation still tends to be slavishly reductionist. This reductionist approach ignores many of the significant anomalies that are apparent in medical practice. The placebo effect, the influence of the doctor-patient relationship, and the patient’s personality on the course of an illness are all inexplicable using this model.² This model is no longer considered adequate for the scientific tasks and social responsibilities of comprehensive medicine today. A new biopsychosocial model should include the psychosocial without sacrificing the biomedical approach¹.

Observers like Gendron (above) have noted for centuries the association of physical disease with mental distress without being able to quantify it. A new model would help explain the biochemical defects of a disease, the point in time when a person falls ill, and why some individuals experience as illness conditions which others regard as problems of living.¹

The significance of psychosocial issues in family practice has been recognised by primary care physicians

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for many years but has been difficult to quantify especially in relation to hard data used by more "scientific" medical disciplines. However, recent advances in immunology have documented links between emotions, immunologic functioning and subsequent disease.

Strong links between emotions, immunologic functioning and subsequent disease

A major premise of this work is that stress enhances vulnerability to certain diseases by exerting an immunosuppressive effect. Diseases mediated by immunological mechanisms such as infections, malignancy, and autoimmune disease are particularly affected. The individual's capacity to adapt to stress is critical and this is in turn influenced by diverse factors such as coping styles, social support, and illness behaviour.⁴

How does stress influence the development of an illness?

The maintenance of immune competence is the result of a complex interaction of many variables. Because of this, clearly defined causal relationships between stress and immunity are often difficult to demonstrate. However, many studies have demonstrated an increased incidence of illness following stressful life events. Empirical studies show too that adequate social support can ameliorate the effect of stress by improving the individual's coping skills and helping him adapt to life changes.⁴

The most convincing role for stress has been suggested in the onset of infections; medical students have more herpes virus and respiratory infections at exam time. Another study in military cadets has shown that psychosocial stress in the form of high academic demands associated with poor achievement correlates with the development of infectious mononucleosis. These changes which are indicative of poor cellular immunity are more marked in students reporting high levels of loneliness, exam stress and unhappiness. Another study has linked the need for power (Type A personality), low saliva IgA levels, and recurrent upper respiratory infections.³

Several studies support the role of psychosocial factors in the onset and outcome of malignancies, but this is less well defined.⁴ Breast cancer has been linked to behaviour patterns characterised by suppressed anger and avoidance of conflict. The Western Electric Health study showed that depressed men had double the expected death rate from malignancy over seventeen years.⁴ Other studies have not shown such a clear association between mood and

Stress enhances vulnerability to certain diseases

malignancy. One experimental study indicates that both immune suppression and depression are non-causally correlated consequences of stress.⁵

The effect of social circumstances on immunity has been demonstrated in a

series of experiments in which infant monkeys were separated from their mothers and a corresponding reduction in their cellular immunity (depressed lymphocyte transformation) occurred during this period. Similarly, prematurely weaned rats had poor cellular immunity and a

Medical students have more herpes virus and respiratory infections at exam time

much higher rate of respiratory infections than controls.³ It is interesting to speculate if young children in creches and other institutions will have similarly poor cellular immunity to account for their high incidence of infections.

Human studies

Human studies have demonstrated the critical role which duration and timing of the stress plays in its effect on the immune system.

Bereavement has been linked to later ill health and increased mortality in several studies.³ In a group of bereaved spouses cellular immunity (T-cell function) showed a highly significant depression over an eight week period. There were no associated hormone changes to account for this.⁶

Medical and psychiatric registrars have reduced cellular immune function and increased infections before exams, this was more marked in subjects reporting high levels of distress.

A group of accountants were assessed

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at different times during the tax year. They were a highly stressed group exhibiting extreme Type A behaviour, high levels of anxiety and poor coping skills. Their immune function was increased at times of peak stress, but suppressed in the post stress period.⁷

Many studies support the role of psycho-social factors in the onset and outcome of malignancies

Distress, loneliness, and lack of social support and poor coping skills have all demonstrated a significant adverse effect on immune function. Natural killer cells (whose function is to recognise and kill tumour cells and virus infected cells) have reduced activity in this situation, and this may result in increased malignancy.

These and other studies have led to the hypothesis that acute stress tends to reduce immunocompetence, while chronic stress may enhance it. The ability to cope with stress appears to protect against its noxious effect. Hence the individuals ability to adapt to a changing environment and to learn new coping skills may directly influence his immunity.

How does stress influence the immune system?⁸

Virus infected human peripheral blood cells have been shown to produce interferon, ACTH, and endorphins. Similarly mouse spleen cells can produce ACTH, endorphins, TSH, and somatostatin. These hormones have identical activity to their pituitary gland

counterparts. Experimental stress caused an increase in ACTH producing leucocytes.

The hypothalamic hormone CRF (corticotrophin releasing factor) can cause the synthesis of ACTH by human peripheral blood cells. Thus not only do leucocytes produce neuroendocrine hormones (ACTH, CRF) when exposed to infection, this function is regulated by the central nervous system via the hypothalamus.

Several animal experiments have demonstrated this to be a functionally important process in immunoregulation.

Thus it seems that the immune and endocrine system actually form an integrated circuit. Cognitive stressors acting via the hypothalamus have a direct action on the immune system (T-cells). Conversely, a physical stress such as a viral infection can stimulate the lymphocytes to produce neuroendocrine hormones and activate the endocrine system. This probably accounts for the increased corticosteroid levels noted during bacterial and viral infections.

Learning new coping skills may directly influence your immunity

This "hypothalamic immunopituitary axis" is the postulated mechanism by which psychosocial stress alters an individual's immune response and his susceptibility to disease.

Thus we see that anecdotal evidence from medical practice has accumulated over many years

indicating a link between stress and health. Although this link has been obvious to many physicians, particularly those in family practice, it has been difficult to quantify. Scientific medicine with its emphasis on objective measurable parameters and tunnel vision of a mind-body split, has been unable to accommodate these anomalies and has tended over the years to ignore them as being irrelevant.

Support the patient to maintain integrity of the immune system

Accumulating clinical trials however have shown a clearly relevant association between stress and the onset and course of several illnesses. Newer research tools have elucidated some of the mechanisms through which stress alters immunity, and have shown a significant stress induced reduction of cellular immunity. A functional link between the immune and neuro-endocrine systems has been demonstrated and it is postulated that this link is responsible for the complex response to stress.

The progress in this work is significant to family practice in that it will probably validate some of the basic principles of family medicine; it emphasises the multifactorial aetiology of illness and the importance of the wholistic assessment of the patient and the family. The family physician should be aware of the increased risk of illness in individuals and families experiencing stressful life changes.

Conversely, one should be aware of

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the role of stress in those patients who present with recurrent unexplained illness. The importance of the doctor-patient relationship and the therapeutic value of the physician himself (The "drug" doctor) in the healing process, is not only to provide emotional support for the patient. The alleviation of stress induced distress and depression will help maintain integrity of the immune system and improve the individual's resistance to disease. This support may also improve the prognosis of existing disease.

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