# Post-Polio Health POLIO NETWORK NEWS

"Many of the popular claims made for the power of the mind to alter the health of the body are based on speculation, but a growing body of sciencebased research is now establishing the role that the brain plays in health and disease. The findings of this new field of study have the potential to revolutionize our understanding of the brain and the body as an interconnected whole."

> Brain-Body Science: A Progress Report, The Charles A. Dana Foundation, Brain-Body Institute, December 1999

## Stress

Stress begins in the brain and is expressed in the body as well as in the state of our minds. When we find ourselves in a situation that challenges us emotionally or physically, we react with the classic "fight or flight" stress response. The brain sends out chemical messengers in the form of stress hormones to almost every system and organ of the body, setting off a cascade of physiological changes.

Heart rate, blood pressure, and muscle tension rise sharply, the stomach and intestines become less active, and the blood level of glucose (blood sugar) rises for quick energy. The brain arms the body for battle or escape. Stress hormones activate immune cells that rush to the battlefield to protect the body from whatever is threatening its stability. When the stressful event is over, the body returns to normal functioning.

Understanding both the social conditions that trigger this response, as well as the psychological states that may buffer or protect us from stress, is critical.

### The Toll of Chronic Stress

Chronic stress creates a different scenario. For example, if you are under constant pressure at work, or having difficulties with a spouse or loved one, the body reacts with the stress response. But if the stressful situation continues over days, weeks, International Polio Network SAINT LOUIS, MISSOURI USA

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or months, the stress response may not turn off. If it doesn't, protective hormones shut down the regular repair and maintenance functions of our bodies. The result can be a suppressed immune system, prone to infection.

The cumulative toll of stress can affect the body in a number of ways. Scientists have observed bone loss, muscular weakening, hardening of the arteries, and increased insulin levels that cause greater levels of fat deposition in the body, especially around the abdomen. Some people end up with the "apple" body shape that researchers have shown predisposes some individuals to heart disease.

#### Stress and Natural Killer Cells

Many researchers have focused on the activity of natural killer (NK) cells – specialized immune cells that protect the body from health threats by seeking out and destroying abnormal or virus-infected cells

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## An Antidote to Post-Polio Stress: Pleasure Seeking

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When talking about stress, we must distinguish between stressful events (stressors) and a person's reactions, both physiological and psychological, to such events (stress responses). There are some events that almost everyone would experience as very stressful: consider the late effects of polio. Lightening has struck us twice; the physical gains we achieved melt away and the lives we built are threatened on every side by ongoing losses such as forced early retirement or the inability to continue favourite social and leisure activities. How will it all end?

Post-polio is a chronic stressor in response to which our stress levels fluctuate. Such changes may be caused by happenings (a fall, a new symptom, lack of access, being dropped from a friend's social calendar) and/or by our state of mind and body (tiredness, pain level, other worries). When we feel stressed our post-polio symptoms get worse<sup>1</sup>. So life often becomes a vicious circle. We receive much advice on techniques to reduce both stress levels and symptoms of fatigue, pain, and increasing weakness. So we learn to pace ourselves, slow down, delegate, have

rests during which we do absolutely nothing, give ourselves permission to say 'No' (to all the nice things we want to do), meditate, do relaxation and stretching exercises, purchase aids and special equipment, and try

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- as physiological "markers" of immunity. Changes in the number or responsiveness of NK cells have been linked to a number of diseases, and they seem to be critical to the body's defense against viral infections and cancer. Stress, even the stress of loneliness, can lower NK cell activity in normal populations. Stress can also depress the ability of NK cells to wipe out tumor or viral-infected cells.

## Stress, Cancer, and Social Support

If stress can suppress immune function, it then makes sense that psychosocial interventions designed to reduce stress – such as support groups, medication, relaxation therapy, or other stress reduction techniques – might have a positive effect on immune function.

Nowhere is this more obvious than in studies that have looked at cancer survivors. There are more than eight million cancer survivors in America today. With new treatments, advances in surgery and drug therapy, as well as earlier awareness and detection of the disease, more people are discovering that a diagnosis of cancer is not a death sentence. They survive. But the stresses of chemotherapy, unsettled family relationships, and interruptions in the regular schedule of work and leisure time, can create what the National Cancer Institute calls "survivor stress." a state of mind that can have serious health consequences.

Many researchers believe that handling stress successfully plays a prominent role in the ability of a cancer patient to survive and avoid recurrence. Evidence exists to show that stress alters immune function, and may weaken the ability of the immune system to play its critical "surveillance role" in controlling some cancers.



#### The Stress Response

When the brain perceives stress, it immediately releases adrenalin from the adrenal glands and corticotrophin-releasing hormone (CRH) from nerve cells in the hypothalamus. CRH travels to the pituitary gland, where it triggers the release of adrenocorticotrophin hormone (ACTH), which then stimulates the production of cortisol in the adrenal glands. Cortisol sustains energy, but it also curbs the surge of adrenalin and turns off CRH.

## What the Studies Show

 Chronic stress lasting a month or more doubled the incidence and severity of the common cold. (Cohen, S. et al., 1998)

 "Lonely" medical students have lower levels of NK cell activity than those who have friends they care about. (Kiecolt-Glaser, J.K. et al., 1987)

 Stress can be measured in the body. Eight physical indicators – from blood pressure to cortisol levels to abdominal fat – can be measured to give a tangible indication of an individual's stress load. (McEwen, B.S., 1998)

Ongoing research continues to look at the positive effects of psychosocial support. It isn't clear yet that the beneficial effect on survival rates is the direct result of improvement in the immune response. Psychosocial interventions may also work by helping patients increase their adherence to medications or by improving their nutrition. In addition, not all cancers are responsive to psychosocial interventions and their effectiveness may also be directly tied to the stage of cancer at which they are introduced. But there is solid evidence that providing some cancer survivors with social support increases the likelihood of recovery and lengthens their survival time.

Extracted from *Brain-Body Science: A Progress Report,* The Charles A. Dana Foundation, Brain-Body Institute, December 1999

# Want to know more about the brain and brain-body science?

Publications of The Charles A. Dana Foundation include *Brain Work: The Neuroscience Newsletter*, a bi-monthly newsletter for the general public on recent advances in brain research; *The Brain in the News*, a bi-weekly compilation of articles from the popular press on brainrelated research; and *Brain-Body Health*, a quarterly newsletter for the general public on brain-body science and health.

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