

REFRIGERATOR RIGHTS—THE MISSING LINK IN HEALTH, DISEASE, AND OBESITY

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Breath therapy, wander gardens, and yoga. The thread connecting these various healing techniques is the concept of allostasis—the ability to achieve stability through change. Restoring allostasis, the balance that prevents the chronic activation of the stress-response, is critical in addressing the epidemic of stress related disorders. Hans Selye, MD, PhD, who first described the stress response, understood the inherent paradox that the physiologic systems triggered by stress can both protect and damage the body. The effect of stress is mediated through the autonomic nervous system and the hypothalamic-pituitary adrenal (HPA) axis when it interacts with the cardiovascular, metabolic, and immune systems in response to internal or external stressors. The consequences of unremitting stress on our health is perhaps the most challenging and clinically difficult problem to address. The benefits of addressing the over-taxed stress response are clear from the papers presented in this issue of *Alternative Therapies in Health and Medicine*. Disparate conditions such as back pain, obesity, and dementia appear to be ameliorated through restoring balance to the autonomic nervous system and the HPA axis. Three articles in this issue underscore the necessity of incorporating clinical tools to modulate and balance the stress response. In our culture, we are pressured by innumerable to-do lists, lack of time, and more importantly, a lack of kinship and the disintegration of our social fabric that historically provided a buffer for life's stresses. As a result, finding our biologic pause button becomes more critical.

The mind-body connection has been well established, but, perhaps, a more critical and primary link to our ill health and stress-related disorders—the mind-body–community connection—has escaped the conventional and integrative medical worlds. The disintegration of communities, the separation of families, the intrusion of popular culture into our lives, the migration of the population from region to region for work or leisure, the lack of rich social and family networks, all prevent the normal buffering from trauma and stress humans received throughout evolution through the support of tribes and large

family groups. The loss of “refrigerator rights” is a fundamental problem in our culture that has insidious and continuous effect on our health. How many people in your immediate social network can come over to your house, walk over to your fridge, and help themselves to leftovers? How many people in your circle, or in your town, afford you that right? The loss of close, intimate connections creates a broad echo of isolation and distress and underlies the difficulties we have in recovering from stress. Isolation plays a key role in the ever-expanding incidences of depression, anxiety, and post-traumatic stress disorders we see in our practices. We hire therapists, trainers, advisors, and coaches to fill the void caused by the lack of people in our circle with refrigerator rights.

Maybe the lack of refrigerator rights is behind our obesity epidemic. The paper by Kristal et al highlights an unappreciated aspect of the obesity epidemic—the impact of stress on weight gain. How can yoga be associated with weight loss? Is it simply the calories burned or perhaps something more lasting that occurs in yoga practice? Few techniques or tools are available to restore balance to the autonomic nervous system. Yoga is one such tool, and its effect, perhaps, is mediated through resetting our bodies' alarm systems, finding the pause button that extracts the practitioner, even for a moment, from the unrelenting effects of chronic stress. A wide body of literature on obesity and stress suggests that obesity is, in part, the body's way of protecting itself from danger. It is the alarm response unchecked.

A STATE OF ALARM

Ester was a dancer and loved life. She moved gracefully through it, always delicate and light. Her children were her greatest passion — all beautiful and grown, smart and loving. Nearing seventy, Ester never struggled with her weight. Never much for formal exercise, she walked, gardened, and still danced. Then one of her daughters moved to Israel during the worst period of the uprising and escalating violence. Ester began to watch CNN day and night, waiting, anxious, and expectant. Would her daughter be safe? Was the latest caf bombing or suicide bomber in her neighborhood? This went on for months and months, despite attempts by Ester's family to distract her. Her daughter would call and reassure her that she was happy and safe, but that did little to settle her anxiety. Ester's stress multiplied by the day, and so did her dress size. She gained 35 pounds watching CNN.

While hours of television watched is directly correlated with weight gain, in Ester's case, it was compounded by the state of alarm washing over her nervous system. It was as if she was living in a war zone herself, and the hormones produced during stress made her gain more and more weight. She didn't need to exercise more or change her diet; she needed to massage her nervous system, to quiet the molecules of alarm that were making her gain weight. She only needed to remove one thing from her diet—CNN. Once her daughter returned from Israel, her weight returned to normal.

STRESS AND OBESITY: THE ALARM RESPONSE

Researchers immobilized rats in a cage and observed the effects on their weight.¹ During their immobilization, the rats were in a constant alarm state; they exhibited the flight or fight response—in which all of the molecules that say *danger* surge through the bloodstream. We have all felt that sudden rush in a moment of terror. But most of us don't notice that the effects of chronic stresses that we live under every day—stressful jobs, marital tension, lack of sleep, too much to do and too little time to do it—make our bodies respond as if we were rats restrained in a cage.

In the experiment, it was hypothesized that the rats had a surge of alarm molecules, a surge that is triggered by messages sent by the brain (the hypothalamus and pituitary), which stimulated the adrenal glands to release adrenaline and cortisol, the stress hormones. This response helped the rats prepare for danger by increasing blood fats, sugar, and insulin; however, triggered too often, the response leads to insulin resistance or metabolic syndrome. The same response occurs in people who live under chronic stress. This connection between stress and impaired metabolism is not well appreciated. Without any increase in calorie intake (they actually ate less) or decrease in energy expenditure from exercise, the rats that were tied down gained weight.

How can you eat less and exercise and still gain weight? It might make evolutionary sense. Under any physical or psychological stress, the body is designed to protect itself, and one way it does that is to conserve weight. Per Bjorntorp, MD, PhD, a professor of medicine from the University of Goteborg in Sweden, has dissected the role of stress in the current epidemic of obesity.¹ He draws links between the stress from psychosocial or environmental factors and abdominal obesity. But how, exactly, are stress and obesity linked?

WHAT IS STRESS, AND WHERE DOES IT COME FROM?

Stress is defined as a real or perceived threat to a person's body or ego. Stress might be caused by being chased by a rhinoceros, or just by feeling helpless. It might be caused by depression or anxiety. Stress also might be caused by psychosocial factors, such as low socioeconomic status, an unfavorable marriage, isolation, or unemployment. It also can be caused by physical stressors: infections, inflammation, exposure to cold, environmental toxins, pain, excessive exercise, smoking, alcohol, and stimulants. Dr. Selye first coined the term in a paper in *Nature* in 1936

titled, "A Syndrome Produced by Diverse Nocuous Agents"² in which he defined stress as "the nonspecific response of the body to any demand." Of course, Woody Allen and James Bond might have very different responses to the same stressor, such as having a gun pointed at them. The key factor lies in the *perception* of the stress. The body has a stereotyped way of reacting to stress, whatever its source. The brain signals an alarm state, which is a good thing in times of danger. Chronic, prolonged stress, however, creates a series of chemical responses that trigger fat deposition around the waistline—what we call visceral, or abdominal, fat. Visceral fat produces even more cortisol, the major stress hormone, leading to a vicious circle in which stress and weight gain feed each other. Researchers have found that, for some people, the feedback to the brain, which normally shuts down cortisol production, is impaired. These people have variations in the genes or polymorphisms that code for the cortisol or stress receptors in the brain. They have no brake on the stress response and tend to gain more weight under stress.

STRESS: HORMONES OUT OF BALANCE

When the brain is chronically stressed, many other hormones get out of balance, making the situation worse. For example, cortisol makes us less sensitive to leptin, the hormone that tells our brains we are full. When this happens, we tend to eat more and crave more sugar. That is why we're inclined to eat more under chronic stress. (Acute stress causes a drop in appetite.) Many people who are under chronic stress suffer from "night eating syndrome," a condition that leads to a decrease in appetite in the morning, increased hunger and eating at night, and difficulty losing weight. These people typically have high levels of cortisol. In one study of such individuals, however, a mere one week of relaxation training resulted in lower levels of cortisol, hunger, and food intake at night.³ In another study, parents of cancer patients gained more weight over three months without any significant differences in diet or activity level compared to parents of healthy children.⁴ Additional research showed that women with high levels of perceived internalized racism had higher levels of cortisol and were more likely to be overweight and accumulate fat around their bellies.⁵ Furthermore, in a study of women, it was found that those with self-reported anxiety had higher levels of cortisol and cholesterol, lower levels of testosterone and thyroid hormone, and more weight around their middles compared to women who did not report such anxiety.⁶ Stress also has been shown to decrease testosterone, which leads to muscle loss and fat accumulation. When men watched football and their team won, their testosterone levels increased. When their team lost—a perceived stress—their testosterone levels dropped.

Many other effects occur from the chronic alarm state, leading to a burned-out metabolism and obesity. Growth hormone, testosterone, and high-density lipoprotein, or good cholesterol, drop, whereas insulin, and blood sugar, cholesterol, blood pressure all increase. Without a way to counteract the effects of chronic stress, we are on a slippery downward slope to obesity and ill health.

Prolonged, unremitting stress may lead to insulin resistance, diminished sex drive, and infertility.⁷ Additionally, it leads to loss of muscle mass and an increase in visceral fat. Cholesterol, blood pressure, and triglycerides increase under conditions of unremitting stress, and increased fatigue and restless sleep are also common. The immune system is activated, and the inflammatory response and oxidative stress increase under chronic stress.

LOSS OF RHYTHM AND LOSS OF SLEEP: HIDDEN FACTORS THAT PROMOTE WEIGHT GAIN

As stress persists, the normal circadian rhythm of hormones is impaired. Consequently, hormones go up when they should be down and go down when they should go up. The unchecked stress response leads to burnout. Cortisol increases in the morning to wake us up, stimulate our appetite, and provide energy for the day. At night, it normally decreases, and growth hormone and melatonin rise, facilitating sleep and repair of the body. With metabolic burnout, the normal rhythm is gone; this promotes even more weight gain. Sleep deprivation is another major source of stress in the modern world. On average, during the last 40 years Americans sleep two hours less each night. What effect does this have on metabolism and weight? A group of researchers found that depriving healthy men of sleep led to increases in ghrelin, the hunger hormone, and decreases in leptin, the satiety hormone. These hormonal changes lead to increased hunger and craving for calorie-dense, high-carbohydrate foods.

Genetics and obesity may be less important than stress and obesity. Twenty pairs of identical twins who differed by more than 37 pounds in weight were studied. The overweight twins had higher levels of the stress hormones adrenaline and cortisol, poorer-quality sleep, drank more alcohol, and had higher perceived levels of stress. There was no difference in their genes, only in their stress levels.⁸

All of these metabolic disturbances lead to weight gain. Furthermore, the endocrine system is interconnected, and stressors that lead to increased insulin production, such as high-glycemic foods or a big meal, can cause stress and higher cortisol levels,⁹ perpetuating a vicious circle. Stress is also one of the major factors in the development of the metabolic syndrome.

THE BRAIN-GUT CONNECTION: THE WIRED FAT CELLS

The idea that fat is just a storage depot for energy that may be required during starvation is quickly falling away. Fat cells are now considered an endocrine organ, a part of the hormonal communication system. Not only are fat cells an active endocrine organ that sends messages out to the rest of the body to regulate weight, metabolism, stress hormones, and inflammation, they are wired directly to the nervous system. The brain controls your autonomic or automatic functions—breathing, heart rate, blood pressure, etc—without your having to think about them. Fat cells are innervated by the autonomic nervous system, which controls the effects of alarm or relaxation. The alarm system is called the

sympathetic system. The relaxation system is called the parasympathetic system. Under stress, the brain sends signals through the alarm system, or sympathetic nerves, to the visceral fat cells, reducing metabolism, insulin sensitivity, and fatty acid oxidation, leading to weight gain. Activation of the parasympathetic response has the opposite effect—an increase in fatty acid oxidation, insulin sensitivity, and weight loss. Unfortunately, relaxation is not something that just happens. It is an active process. Stress comes automatically for most of us. Relaxation does not. Practicing yoga, progressive muscle relaxation, meditation, tai qi, qi gong, taking a hot bath or sauna, and exercising are all things that you have to *do*.

RESTORING ALLOSTASIS: FIND THE PAUSE BUTTON

Balancing the autonomic nervous system, turning down the stress response, and turning up the relaxation response requires multiple efforts. Removing or reducing stress triggers, both physical and psychosocial, is also important. A comprehensive and integrated program is needed to balance the HPA axis. Practicing breath therapy, yoga, or a walk in the garden may be helpful. There are many components of effective therapy for restoring balance or allostasis to the stress response, however, including diet, exercise, relaxation therapies, breathing, nutrients, adaptogenic herbs, hyperthermic therapy, hydrotherapy, psychotherapy, and even medication. And, perhaps, the most overlooked and most important, is the establishment of refrigerator rights in our lives.

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