



# The Biology of Stress

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The third in a series exploring the physical impact of stress. This time, acute versus chronic stress.

*Parts 1 and 2 of this series discussed the concept of allostatic load—the stress-driven accumulated wear and tear on the body—and explored how stress impedes the immune system. This installment looks at some differences (and similarities) between acute and chronic stress and how each affects the body.*

Imagine that you're in the woods and suddenly come face to face with a bear. A jolt goes through your system, your heart kicks into overdrive, your mouth goes dry and your thoughts momentarily fly from your mind. This is the famed “fight or flight” response in action—a distinctly physical response speaking to very specific bodily systems.

Now imagine living a life of hardship and poverty, where meeting your most basic needs is a constant challenge with no end in sight (see article on page 24). This, of course, is a very different form of stress and yet it evokes responses in many of the same bodily systems.

The term *stress* covers a wide swath of scenarios, but—from bear attack to ongoing hardship—the majority of stressful situations fall into one of two categories: acute stress or chronic stress. And both evoke a physical response.

Acute stress comes from immediate or closely anticipated demands, pressures or distress—things like an

auto accident, impending deadline or intense traumas like abuse and catastrophic events. The body reacts to these stressors in much the same way as meeting that bear in the woods—by preparing to protect or defend itself.

First, the hypothalamic-pituitary-adrenal (HPA) system triggers the release of steroid hormones (glucocorticoids) to help marshal other systems throughout the body. The HPA system also releases certain chemical messengers (catecholamines) that activate the part of the brain associated with emotional response and suppress activity in areas concerned with short-term memory, rational thought and inhibition. This sequence of mental events facilitates swift and decisive action.

Meanwhile, the heart rate and blood pressure increase instantaneously, preparing to power the body into action. Breathing becomes rapid, providing additional oxygen, and the spleen discharges red and white blood cells, allowing the blood to transport more oxygen throughout the body.

Blood flow is diverted away from the skin to support the heart and muscle tissue. Similarly, fluids are diverted from nonessential locations like the mouth, and the immune system redis-

tributes its troops to the body's front lines, where injury or infection is most likely. All nonessential body functions like digestive activity cease.

Within seconds, the body is primed for imminent battle or escape.

With such drastic physical changes occurring, sometimes the experience of acute stress can itself be considered a physical trauma, with effects that persist. Acute stress disorder (ASD) is a condition characterized by a cluster of dissociative and anxiety-related symptoms (including loss of memory, emotional detachment, sleep problems) occurring within one month of a traumatic event. Post-traumatic stress disorder (PTSD) is a condition related to long-term effects from acute trauma.

Under most circumstances, however, once the acute threat has passed, the body's reaction is deactivated and systems return to normal, a condition

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**The body reacts to stressors by preparing to protect or defend itself in a physical way.**

called the relaxation response, resulting in a balanced state called allostasis.

Frequently, however, life poses ongoing or recurring stressful situations that don't fit the model of acute response and subsequent relaxation. This chronic stress causes the body to

rev into its defense state repeatedly. Continual surges of adrenaline can damage blood vessels; escalations in blood pressure can trigger heart trauma and other problems.

Chronic stress can also keep the body's systems on a constant level of alert that prevents allostasis. As discussed in the first part of this series ("The Biology of Stress: Part 1," *CFIDS Chronicle*, spring 2006), over time the body can accumulate what's called allostatic load—the physical wear from a chronically activated stress response. The same systems involved in fight or flight, from the adrenal system to the immune system, struggle under the load. The end result is a body compromised.

For example, studies have shown that people who've had excessive stress in their lives, as measured by multiple episodes of living at the poverty level, show an earlier decline of physical and mental functioning. Similarly, people enduring ongoing stress like caring for a loved one with Alzheimer's, require longer time for wounds to heal. Even primates, when subjected to a continually changing environment, show an increase in blood pressure and accelerated atherosclerosis (clogged arteries) due to chronic stress.

More specific to chronic fatigue syndrome (CFS), a study of CFS patients in southern Florida found that the chronic stress of Hurricane Andrew's aftermath increased CFS relapse rates and symptom expression. Two-thirds of CFS patients dealing with prolonged utility outages, displacement and other postdisaster stressors experienced clinical relapse, compared to fewer than 9 percent from neighboring areas where hurricane damage was minimal. The CFS patients exposed to the storm and the chronic stress of its aftermath also showed increased frequency of symp-

toms and a greater burden of illness.

And it doesn't take a hurricane to evoke a CFS relapse. Most people with CFS will tell you they notice a worsening of symptoms during periods of increased stress.

Ultimately, the greatest difference between acute and chronic stress lies more in the situation than the body's

reaction to it. In each instance, the body's systems work together to initiate a powerful defense. This is easy to see in the dramatic physical response to acute stress. Yet the physical ramifications of chronic stress, less vivid but arguably more hazardous, stem from the same biologic response. ■

## MANAGING ACUTE AND CHRONIC STRESS

Acute and chronic stress differ in many ways. Here are some tips for managing the effects of each.

### Encourage the relaxation response that's meant to follow the fight or flight response.

Prepare and practice a variety of relaxation techniques you can employ immediately following an episode of acute stress. Controlled breathing exercises, deep relaxation tapes and relaxation imagery can each help the body return to allostasis. Find the technique that works best for you and be ready to use it following immediate points of stress. Ultimately this can become your secret weapon for aiding recovery from acute stress. Mindtools.com is one place you can download "deep relaxation" recordings (\$8.95 each), and most bookstores carry relaxation tapes and books on other techniques.

### Recognize your body's signs of stress

Learn to tell when your body is shifting into its stress response. Sometimes just acknowledging the stress response for what it is can help prevent additional anxiety. Taking a moment to identify and acknowledge the cause can also help contain escalation, even if you cannot immediately address the issue. At other times, early recognition offers a chance to remove yourself from a situation before it takes a greater stress toll.

### Strengthen social connections and support systems

People with more social ties tend to have less allostatic load and show an increase in the ability to process both acute and chronic stress. But greater social connection doesn't have to mean attending more social events. Meaningful conversations or e-mails (even brief), acknowledging the goodwill of a friend or connecting with others online can all decrease isolation. Seek even small ways you can keep in touch with others without exhausting your energy. A sense of connection can be an important factor in weathering stress. ■

### In the next issue!

Stress is more than an emotional catalyst. It triggers physical responses that can affect our health. The winter issue of the *CFIDS Chronicle* will describe techniques for tracking and managing the scope of stressors in your life.