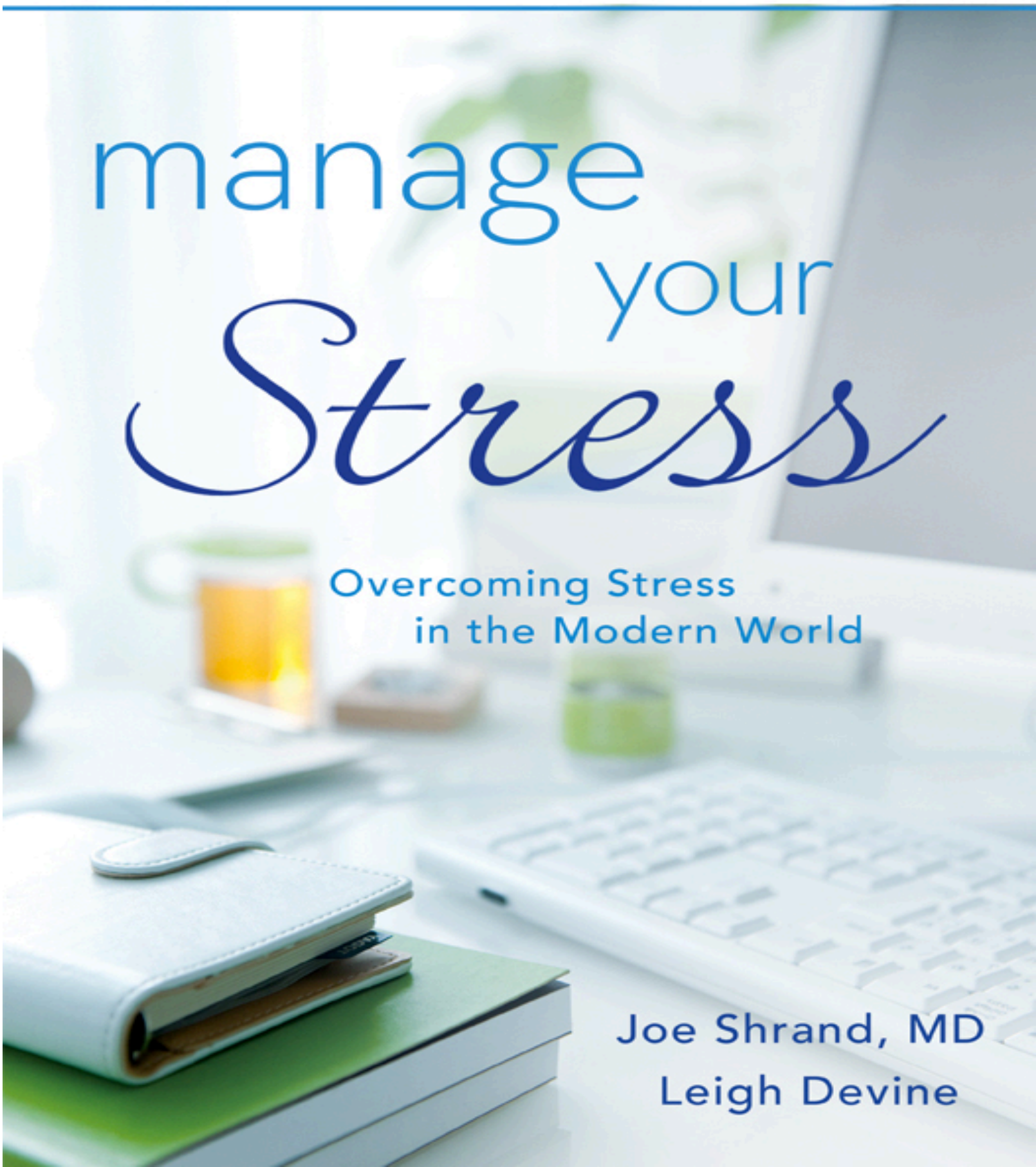
Trusted advice for a healthier life
from Harvard Medical School
manage your Stress
Overcoming Stress
in the Modern World
Joe Shrand, MD
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Manage Your Stress

Overcoming Stress in the Modern World

Joseph A. Shrand, MD
with Leigh M. Devine, MS

St. Martin's Griffin New York

To my departed loved ones:
My dad, Hyman Shrand, my mom, Frances Shrand, and my sister, Susan Shrand.
I miss the way you helped me.
—JOSEPH

To my mother, Elaine Fraser Devine.
—LEIGH

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—Joseph A. Shrand, MD

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part I

What Is Stress?

chapter 1

A Response to Your World

For nearly a decade Jennifer supported herself and four kids as a shrimp-net maker. But after the oil-rig explosion in 2010 shut down Gulf fishing, Jennifer couldn't find other work and was forced to accept charity for the first time. Her hardest moments came at Christmas when she had little to give her children. While things had been tough before, Jennifer recalls that her stress level was at least manageable. "If I only had to worry about my car breaking down here and there, I'd still be pretty happy," she said.

For all of us, stress comes in many different packages. Jennifer's latest stress has been brought on by a sudden, negative change in circumstances. For others, stress comes on in a traumatic way such as a car accident or death of a loved one. But routine, chronic stress that is related to work pressures, family life, and other responsibilities can, in the long run, lead to serious physical and mental health consequences if not managed properly. And this kind of stress can sneak up on you quietly and gradually.

If you've picked up this book because you're thinking that stress may be getting the better of you—or possibly even making you sick—then you are in good company. As the ripple effect of the Great Recession is still being felt across the country, people are reporting both high levels of daily stress as well as acutely stressful events, brought on by the nation's economic woes. According to the American Psychological Association's Stress in America 2010 survey, 76 percent of the respondents cited money concerns as the number one source of stress, followed by work at 70 percent, and worries about the general economy at 65 percent. Despite their awareness of the source, only a third of those surveyed said they were doing a good job managing their stress. And the majority of children whose parents endure very high levels of stress say there is a negative impact on their families.

While it is inevitable that human beings are going to be faced with many types of stressful events throughout a lifetime—from traumatic events to daily irritants—what is not a given is how we respond to those events. We can reduce the impact of stress in our lives and on our health by understanding why we experience stress, what is going on in our brain and body, and how, in fact, we cannot live safely *without* stress.

Your Perception of Stress Triggers

Many people describe their stress in concrete and common ways such as work deadlines, rude drivers, argumentative coworkers, a stack of unpaid bills, being evaluated. The feelings you experience at these times tend to be negative, can put you in a bad mood, or even worse, make you angry and aggressive.

But if you look at these scenarios as a third party or a medical expert, you would see how these instances are actually individual causes or sources of the stress experience. We call them *stressors* or *triggers.* In general, they come in two varieties:

1. common, daily occurrences that grind down on your patience, or
2. unexpected events that seem to conspire against you before you've even gotten to work

You feel like you've been mentally and physically put through the wringer and, in a way, you really have. Your body has reacted to the event of being cut off in traffic almost in the same way as if a rhinoceros had charged you. When you experience a stress trigger your heart beats quickly, your palms and body sweat, blood rushes to your face, and your breathing quickens. Some stress makes us just want to run away or hide. Other times people feel charged, ready to fight after the event has passed. Sometimes people feel exhausted by it, or overwhelmed. Whatever your instinctive feeling may be in those moments, it is what you choose to *do* right after that stress moment that can mean the difference between a ruined or normal day.

All too often we continue to let our fear or anger from a stress trigger stew and feed upon itself. We focus on the event, replaying it, telling it to others. Few of us are taught that what is actually happening in our minds and bodies during a stress trigger is a perfectly normal and protective physiological event. Having the tools to cope and calm ourselves when we are confronted by either a chronically stressful job, or a sudden negative event will make a big difference when we experience the stress response.

In order to understand why we respond to triggers—and it happens to all of us automatically—it helps to look at the human brain and the mechanisms that trigger our stress responses. This journey takes us deep into the central workings of the human neuroendocrine system, which is responsible for the delicate interplay between our brain and the chemicals and hormones that influence how we react and respond to the world around us. Once you begin to learn about why our bodies do what they do, you'll see how stress is a useful partner in life. Without it, we could not have survived as a species.

chapter 2

Biological Origins of Stress

Stress and Survival Go Together

If you've ever seen the film classic *Jurassic Park,* you will remember the heart-pounding scenes where several characters were being chased over the fields by those ferocious velociraptors. Those characters were dramatizing what our evolutionary ancestors no doubt experienced—the need to literally run for your life. While we don't get chased by many reptiles in the modern world, our bodies still react to threats in a similar and automatic way.

It's all about evolution. Hardwired into every mammal's brain is an apparatus for automatic and unconscious scanning of our surroundings—assessing for danger, safety, predators, and much more. There is little doubt that during evolution, there was a survival advantage to having such an efficient safety system in place. The creature that paid no attention to that rustling in the bush became lunch much more often than the creature that recognized the danger and did something. Reacting to the danger bestowed the best chance of survival. Once the brain perceived a danger, the body took action; to attack or defend, run away, or try to hide and become invisible until the danger had passed. Negotiation was not an option.

These days it is unlikely that we will be eaten by a hungry predator. But our ancient brains still respond the way they have for millions of years. Of course, in today's world we have many different kinds of stressors. Instead of having four legs, they often have four wheels or rechargeable batteries. When we are confronted with a stressor—which could be any real or imagined stimulus that requires us to change or act quickly—we feel the inner sensation of our bodies going into an instant, hyperactive mode. Think of what happens to you when you even *think* something dangerous is about to happen. You become *startled*. A car pulls out in front of you unexpectedly. A door slams when no one else is home. You lock your keys in the car. The muscles tense, the heart pounds. We all know intimately how this feels.

This is our neuroendocrine system jolting into action, triggering the release of specialized hormones that produce those sudden and well-orchestrated physiological changes that create the stress response. Exactly how and why these reactions occur and what effects they might have on us over time are questions that have intrigued researchers for years.

Fight, Flight, and the Frightened Cats

Harvard physiologist Walter B. Cannon was a pioneer in exploring the biochemistry of the stress response. His research nearly a century ago convinced him that fright was not all in the mind, but also stemmed from the adrenal glands, two tiny hat-shaped structures sitting atop the kidneys. To test his theory, Cannon set up an experiment in which he caused dogs to bark menacingly at caged cats. He was then able to isolate a hormone secreted by the adrenal glands of the frightened cats. When he injected that hormone into a second, perfectly calm cat, it touched off a fear reaction. The cat's heartbeat and blood pressure shot up, while the muscles enjoyed an increase in blood flow. Cannon called this occurrence the *fight-or-flight-or-freeze* response.

These days, we call it simply the *fight or flight* or the *stress response.* From a survival point of view it makes perfect sense: If you are in danger, you want to send as much energy as possible, in the form of oxygen and sugars carried by blood, to the muscles of your arms and legs so you can either flee, or be prepared to fight for your life. By studying these frightened felines, Cannon had uncovered a critical insight into the stress response: the role of hormones.

The initial stress hormone Cannon isolated was something called *epinephrine.* You might recognize the name, especially if you have or know a child with severe food allergies. An *Epipen,* now a common item in school classrooms to mediate severe allergic reaction, is named after the hormone it administers. Epinephrine pushes open the airways in the lungs. More commonly, we call this hormone *adrenaline,* after the glands that manufacture it. Cannon also discovered a second stress-response hormone called *norepinephrine,* or *noradrenaline,* which makes your heart rate and blood pressure soar during a fight-or-flight reaction. A sudden, rapid rise of norepinephrine is what also causes panic attacks. Other researchers later discovered a third crucial hormone of the stress response, *cortisol* (what I refer to as the "Minutemen"), which further prepares the body to fight or flee by increasing blood sugar to provide energy, suppressing the immune system, and shutting down the digestive system.

Think about what we needed to be able to do if faced with a threat. We would first need to recognize we were in danger. To do this, certain parts of your brain had to remain continually vigilant. At the same time our brain needed to process the meaning of what we observed, as well as look for changes in that environment, such as an approaching animal. After assessing the strength of that animal, your brain would begin to mobilize the body.

In less than a heartbeat, the chemical messenger corticotropin-releasing factor (CRF), what I call the "Paul Revere" of hormones, gets released from your hypothalamus and courses down a neural pathway to the nearby pituitary gland.

As if in a chemical relay race, the pituitary cells then send their own chemical messenger, adrenocorticotropic hormone (ACTH), to the adrenal glands, which mobilize the "Minutemen" of our defenses, spilling cortisol into the bloodstream. Cortisol, the critical stress hormone, helps to convert fats into easy-to-access sugars: the energy we need to run away or stand and fight. Surges of adrenaline and noradrenaline are also released by the adrenal glands on instructions from the brain and simultaneously throughout the body by the sympathetic nervous system. Scientists call this powerful triumvirate of the hypothalamus, pituitary gland, and adrenal glands the *HPA axis.*

This cocktail of stress hormones races through your bloodstream to different parts of your body,

preparing you to fight or flee. Your breath quickens as your body takes in extra oxygen. Energy-boosting glucose and fats are released from storage sites into your bloodstream. Sharpened senses, such as sight and hearing, prepare you to detect changes in your surroundings and respond rapidly. Your heart beats faster, up to two to three times as quickly as normal. Your blood pressure rises. Certain blood vessels constrict, directing blood flow to your muscles and brain and away from your organs and skin, something we have all experienced in the form of cold sweats.

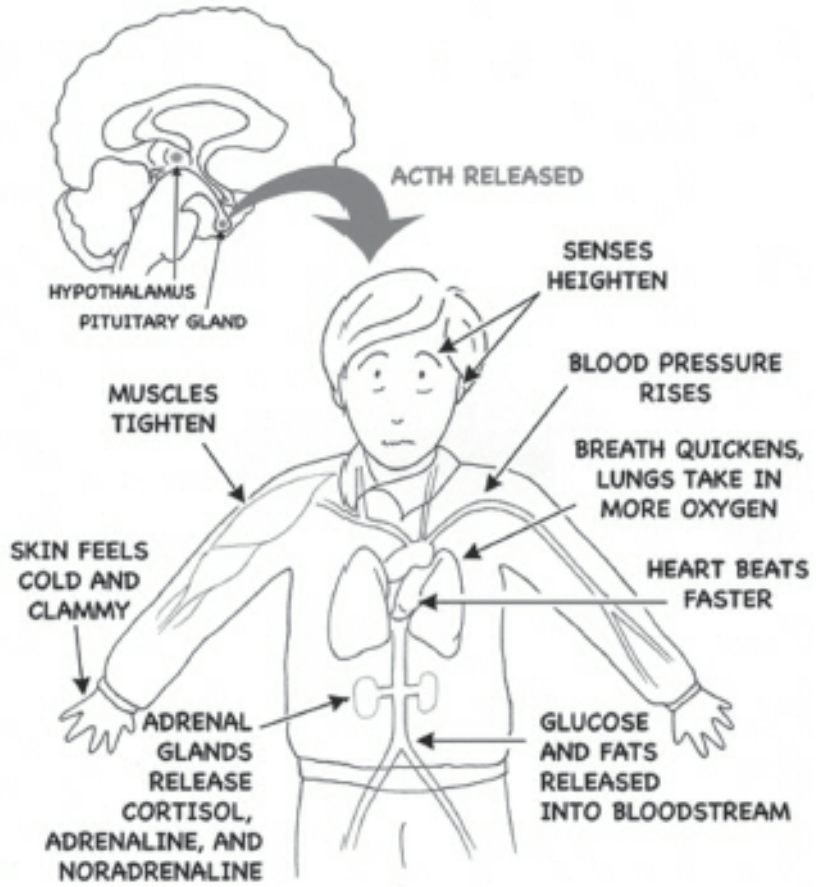

Figure 1: Stress Response (Illustration by Sophia T. Shrand)

Simultaneously, specialized blood cells, called platelets, become stickier, so clots can form more easily to minimize bleeding from potential injuries. The immune system goes into high gear to fight bacteria from possible bites and scratches. Your muscles—even the tiny, hair-raising muscles beneath your skin—tighten, preparing you to spring into action. Body systems not needed for the immediate emergency are suppressed. The stomach and intestines cease operations. Sexual arousal lessens. Repair and growth of body tissues slows. In essence, without being fully aware of how you are doing it, you have primed yourself to combat a perceived (real or imagined) attack.

When the danger passes, the body is designed to naturally bring itself back to that low-grade, seemingly unconscious state of vigilance. Indeed, Cannon believed the stress response was temporary. Minutes after the rush triggered by adrenaline, he thought the body would wind back down to its normal balance, a physical state known as *homeostasis*. Everything reverses and goes back to normal; heart rate and blood pressure; breathing and muscles; platelets and the immune system all go back to their previous state. Your intestines would start their work again, providing new fuel to replace the energy burned in the emergency. Bones would resume repairs or start growing again, and reproductive activity might appear more inviting. You have survived another

day.

With the challenge that sparked the stress response behind you and the parasympathetic nervous system exerting its calming influence, the day-to-day business of your body would resume. However, current research has shown that this recovery does not always work as well as we'd like it to, especially among the many people who experience chronic stress. Those hormonal effects, so vital and heroic during times of fight or flee, can be detrimental to health when the body no longer needs them.

The Positive Side of Stress

Amid all our fears of stress, though, it's very important to recognize that the stress response can be enormously helpful. We can't live and function in the world without it. It is also the stress response that enables people to perform enormous and vital feats. Think about the lifesaving work done by emergency workers and ordinary people confronted in accidents and disasters. When an elderly woman fell onto the New York City subway tracks, a plumber jumped down to grab her just as the train pulled into the station. His stress response saved her life and he was hailed a hero.

The fight-or-flight response can prove beneficial under far less dangerous circumstances, too. Helping someone in need, such as a skier who suddenly falls in front of you, also activates your stress response. But recent studies have shown that people who acted to help and those who *received* help both had lower levels of cortisol in response to stress triggers. This suggests that when we help each other in times of stress we both benefit on a neurochemical basis. In the following chapters, we'll explore how you can use this information **[End of Sample]**