

Stress effects on the body

System<http://www.apa.org/helpcenter/stress-body.aspx>

Musculoskeletal

When the body is stressed, muscles tense up. Muscle tension is almost a reflex reaction to stress — the body's way of guarding against injury and pain.

With sudden onset stress, the muscles tense up all at once, and then release their tension when the stress passes. Chronic stress causes the muscles in the body to be in a more or less constant state of guardedness. When muscles are taut and tense for long periods of time, this may trigger other reactions of the body and even promote stress-related disorders. For example, both tension-type headache and migraine headache are associated with chronic muscle tension in the area of the shoulders, neck and head.

Millions of individuals suffer from chronic painful conditions secondary to musculoskeletal disorders. Often, but not always, there may be an injury that sets off the chronic painful state. What determines whether or not an injured person goes on to suffer from chronic pain is how they respond to the injury. Individuals who are fearful of pain and re-injury, and who seek only a physical cause and cure for the injury, generally have a worse recovery than individuals who maintain a certain level of moderate, physician-supervised activity. Muscle tension, and eventually, muscle atrophy due to disuse of the body, all promote chronic, stress-related musculoskeletal conditions.

Relaxation techniques have been shown to effectively reduce muscle tension, decrease the incidence of certain stress-related disorders, such as headache, and increase a sense of well-being.

Respiratory System

Stress can make you breathe harder. That's not a problem for most people, but for those with asthma or a lung disease such as emphysema, getting the oxygen you need to breathe easier can be difficult.

And some studies show that an acute stress — such as the death of a loved one — can actually trigger asthma attacks, in which the airway between the nose and the lungs constricts.

In addition, stress can cause the rapid breathing — or hyperventilation — that can bring on a panic attack in someone prone to panic attacks. Working to develop relaxation and breathing strategies can help.

Cardiovascular

The heart and blood vessels comprise the two elements of the cardiovascular system that work together in providing nourishment and oxygen to the organs of the body. The activity of these two elements is also coordinated in the body's response to stress. Acute distress — stress that is momentary or short-term such as meeting deadlines, being stuck in traffic or suddenly slamming on the brakes to avoid an accident — causes an increase in heart rate and stronger contractions of the heart muscle, with the stress hormones — adrenaline, noradrenaline and cortisol — acting as messengers for these effects. In addition, the blood vessels that direct blood to the large muscles and the heart dilate, thereby increasing the amount of blood pumped to these parts of the body and elevating blood pressure. This is also known as the fight or flight response. Once the acute stress episode has passed, the body returns to its normal state.

Chronic distress, or a constant stress experienced over a prolonged period of time, can contribute to long-term problems for heart and blood vessels. The consistent and ongoing increase in heart rate, and the elevated levels of stress hormones and of blood pressure, can take a toll on the body. This long-term ongoing stress can increase the risk for hypertension, heart attack or stroke.

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Repeated acute stress and persistent chronic stress may also contribute to inflammation in the circulatory system, particularly in the coronary arteries, and this is one pathway that is thought to tie stress to heart attack. It also appears that how a person responds to stress can affect cholesterol levels.

The risk for heart disease associated with stress appears to differ for women, depending on whether the woman is pre- or post-menopausal. Levels of estrogen in pre-menopausal women appears to help blood vessels respond better during stress, thereby helping their bodies to better handle stress and protecting them against heart disease. Postmenopausal women lose this level of protection due to loss of estrogen, therefore putting them at greater risk for the effects of stress on heart disease.

Endocrine

When the body is stressed, the hypothalamus signals the autonomic nervous system and the pituitary gland and the process is started to produce **epinephrine** and **cortisol**, sometimes called the "stress hormones."

Adrenal Glands (near kidneys)

Stress signals from the hypothalamus cause the adrenal cortex to produce cortisol and the adrenal medulla to produce epinephrine. This starts the process that gives your body the energy to run from danger.

Liver

When cortisol and epinephrine are released, the liver produces more glucose, a blood sugar that would give you the energy for "fight or flight" in an emergency. For most of you, if you don't use all of that extra energy, the body is able to reabsorb the blood sugar, even if you're stressed again and again. But for some people — especially people vulnerable to Type 2 diabetes — that extra blood sugar can mean diabetes. Who's vulnerable? The obese and races more inclined to diabetes, such as Native Americans. Studies show that if you learn how to manage stress, you can control your blood sugar level, sometimes nearly as much as with medication.

Gastrointestinal

- **Esophagus**

When you're stressed, you may eat much more or much less than you usually do. If you eat more or different foods, or increase your use of alcohol or tobacco, you can experience heartburn or acid reflux. Stress or exhaustion can also increase the severity of heartburn pain.

- **Stomach**

When you're stressed, your brain becomes more alert to sensations in your stomach. Your stomach can react with "butterflies" or even nausea or pain. You may vomit if the stress is severe enough. And, if the stress becomes chronic, you may develop ulcers or severe stomach pain even without ulcers.

- **Bowel**

Stress can affect digestion, and what nutrients your intestines absorb. It can also affect how fast food moves through your body. You may find that you have either diarrhea or constipation.

Nervous System

The nervous system has several divisions: the central division involving the brain and spinal cord and the peripheral division consisting of the autonomic and somatic nervous systems. The **autonomic nervous system** (ANS) has a direct role in physical response to stress and is divided into the **sympathetic nervous system** (SNS), and the **parasympathetic nervous system** (PNS).

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When the body is stressed, the SNS generates what is known as the "fight, flight and/or freeze" response. The body shifts all of its energy resources toward fighting off a life threat, or fleeing from an enemy. The SNS signals the adrenal glands to release hormones called adrenalin and cortisol. These hormones cause the heart to beat faster, respiration rate to increase, blood vessels in the arms and legs to dilate, digestive process to change and glucose levels (sugar energy) in the bloodstream to increase to deal with the emergency.

The SNS response is fairly sudden in order to prepare the body to respond to an emergency situation or acute stress, short term stressors. Once the crisis is over, the body usually returns to the pre-emergency, unstressed state.

Chronic distress, experiencing stressors over a prolonged period of time, can result in a long-term drain on the body. As the SNS continues to trigger physical reactions, it causes a wear-and-tear on the body. It's not so much what chronic stress does to the nervous system, but what continuous activation of the nervous system does to other bodily systems that become problematic.

Male Reproductive System

The male reproductive system is influenced by the nervous system. The parasympathetic part of the nervous system causes relaxation whereas the sympathetic part causes arousal. In the male anatomy, the autonomic nervous system, also known as the fight or flight response, produces testosterone and activates the sympathetic nervous system which creates arousal.

Stress causes the body to release the hormone cortisol, which is produced by the adrenal glands. Cortisol is important to blood pressure regulation and the normal functioning of several body systems including cardiovascular, circulatory and male reproduction. Excess amounts of cortisol can affect the normal biochemical functioning of the male reproductive system.

Chronic distress, ongoing stress over an extended period of time, can affect testosterone production, sperm production and maturation, and even cause erectile dysfunction or impotence. Also, when stress affects the immune system, the body can become vulnerable to infection. In the male anatomy, infections to the testes, prostate gland and urethra, can affect normal male reproductive functioning.

Female Reproductive System

- **Menstruation**

Stress may affect menstruation among adolescent girls and women in several ways. For example, high levels of stress may be associated with absent or irregular menstrual cycles, more painful periods and changes in the length of cycles.

- **Premenstrual Syndrome (PMS)**

Stress may make premenstrual symptoms worse or more difficult to cope with and pre-menses symptoms may be stressful for many women. These symptoms include cramping, fluid retention and bloating, negative mood (feeling irritable and "blue") and mood swings.

- **Menopause**

As menopause approaches, hormone levels fluctuate rapidly. These changes are associated with anxiety, mood swings and feelings of distress. Thus menopause can be a stressor in and of itself. Some of the physical changes associated with menopause, especially hot flashes, can be difficult to cope with. Furthermore, emotional distress may cause the physical symptoms to be worse. For example, women who are more anxious may experience an increased number of hot flashes and/or more severe or intense hot flashes.

- **Sexual Desire**

Women juggle personal, family, professional, financial and a broad range of other demands across their life span. Distress, distraction, fatigue, etc., may reduce sexual desire — especially when women are simultaneously caring for young children or other ill family members, coping with chronic medical problems, feeling depressed, experiencing relationship difficulties or abuse, dealing with work problems, etc.

