# Physiology Response To Stress

The body responds physiologically to all types of stress with the hypothalamus central to both emotional and physiological responses because it activates both the sympathetic nervous response and the parasympathetic response:

- When a stressful event occurs, input is sent through the peripheral nervous system (including eyes and ears) to the cerebral cortex and activates the reticular formation in the brainstem.
- The reticular formation relays information to the thalamus and cerebral cortex through a network of neurons involved in arousal and consciousness, the reticular activating system. The RAS maintains wakefulness and alertness.
- Stimulation of the prefrontal area reduces the speed of associations to allow the person time to evaluate (primary and secondary appraisal). The temporal lobe produces fear and alters perceptions of sight and hearing.
- The limbic system mediates emotions and behavior that are necessary for survival. Endorphins are released to reduce perceptions of pain.
- The hypothalamus releases neuropeptides that activate the sympathetic nervous system, which stimulates the adrenal medulla to release catecholamines (epinephrine and norepinephrine) and corticotropin-releasing hormone (CRH), which causes the pituitary gland to release ACTH to stimulate the adrenal cortex. The adrenal cortex releases corticosteroids.
- Blood glucose levels increase in response to stimulation of the adrenal glands and skeletal muscle blood vessels dilate, cerebral blood flow increases, and blood is shunted away from the GI system. Clotting time increases to help maintain blood flow to vital organs. • These processes inhibit the immune system.

## Diseases of adaptation

### • Increased muscle tension:

Prepares muscles for action and reduces muscle fatigue.

### • Increased rate of respirations:

Provides extra oxygen for energy and increased stamina.

### • Increased blood coagulability:

Prevents hemorrhage if trauma occurs. While these processes probably serve a useful purpose in a more primitive or hunter-gatherer society in which people face almost constant danger, in modern society they are often destructive, resulting in diseases of adaptation, or stress-related disorders. Diseases of adaptation may develop directly because of stress or may exacerbate because of physiological responses to stress: Angina Hypertension Asthma Impotence Carpal tunnel syndrome Insomnia Depression Irritable bowel syndrome Eating disorders Low back pain Fatigue/malaise Myocardial infarction, cardiac disease Fibromyalgia Peptic ulcer disease

Headaches Sexual dysfunction Symptoms associated with stress GI Dry mouth. Diarrhea. GI distress. Nausea and/or vomiting. Change in appetite. Emotional Depression. Fatigue. Intense anxiety. Injury-prone. Emotional lability. Nervous habits, nervous laughter. Insomnia. CNS/ cognitive Difficulty concentrating. Headaches. Pupil dilation. Social/ behavioral Urge to act out. Loss of interest in activities. Impulsiveness. Increased substance abuse (tobacco, drugs, alcohol) GU/Gyn. Changes in menstrual cycle. Urinary frequency. Motor/ muscle/ skin Restlessness, hyperactivity. Hyperactive startle response. Increased body tension. Tremors. Bruxism. Excess sweating. Back pain, neck pain, general muscle pain. Cardiovascular Palpitations. Weakness, dizziness. Hypertension. Everyone experiences anxiety, and mild anxiety may serve a useful purpose in motivating people to act, but as anxiety becomes stronger, the resultant stress can have increasing negative effects:

## • Mild:

People may have sharpened senses with a wide perceptual field, increased motivation, and effective problem-solving and learning ability but may also experience irritability, restlessness, “butterflies,” insomnia, and hypersensitivity to noise.

## • Moderate:

People have more difficulty focusing attention as perceptual field narrows to immediate task and attention is selective. People may have difficulty concentrating and may react automatically. Symptoms associated with the sympathetic nervous system (muscle tension, palpitations, dry mouth, highpitched voice, GI upset, frequent urination, headache, diaphoresis) occur.

## • Severe:

People may be able to concentrate on only one or scattered details and cannot complete tasks or solve problems effectively. They may not be able to redirect attention and behavior is often directed toward relieving anxiety, but is usually not successful. People may appear in awe, dread, or horror and may cry out or carry out ritualistic behavior. Physical symptoms become more severe and may resemble a panic attack with severe headache, nausea, vomiting, diarrhea, trembling, rigidity, vertigo, pallor, tachycardia, and chest pain. Levels of anxiety

## • Panic:

The perceptual field focuses only on the self as environmental stimuli cannot be processed. Perceptions are distorted, and people cannot think rationally and cannot always recognize potential danger or communicate verbally. Some people may experience delusions or hallucinations and may become suicidal. People may react by bolting and running or becoming immobile and mute. The fight-flight-or-freeze response is primary.