STRES DAN ADAPTASINYA

STRESS

The concepts of stress and adaptation have their origin in the complexity of the human body and the interactions between the body's cells and its many organ systems.

The body requires that a level of homeostasis or constancy be maintained during the many changes that occur in the internal and external environments.

Stress and adaptation involve feedback control systems that regulate cellular function and integrate the function of the different body systems.

HOMEOSTASIS

Homeostasis is the purposeful maintenance of a stable internal environment maintained by coordinated physiologic processes that oppose change.

The physiologic control systems that oppose change operate by negative feedback mechanisms that are composed of a sensor that detects a change, an integrator/comparator that sums and compares incoming data with a set point, and an effector system that returns the sensed function to within the range of the set point.

FEEDBACK SYSTEMS

- Most control systems in the body operate by negative feedback mechanisms

- positive feedback mechanismsis

THE STRESS RESPONSE

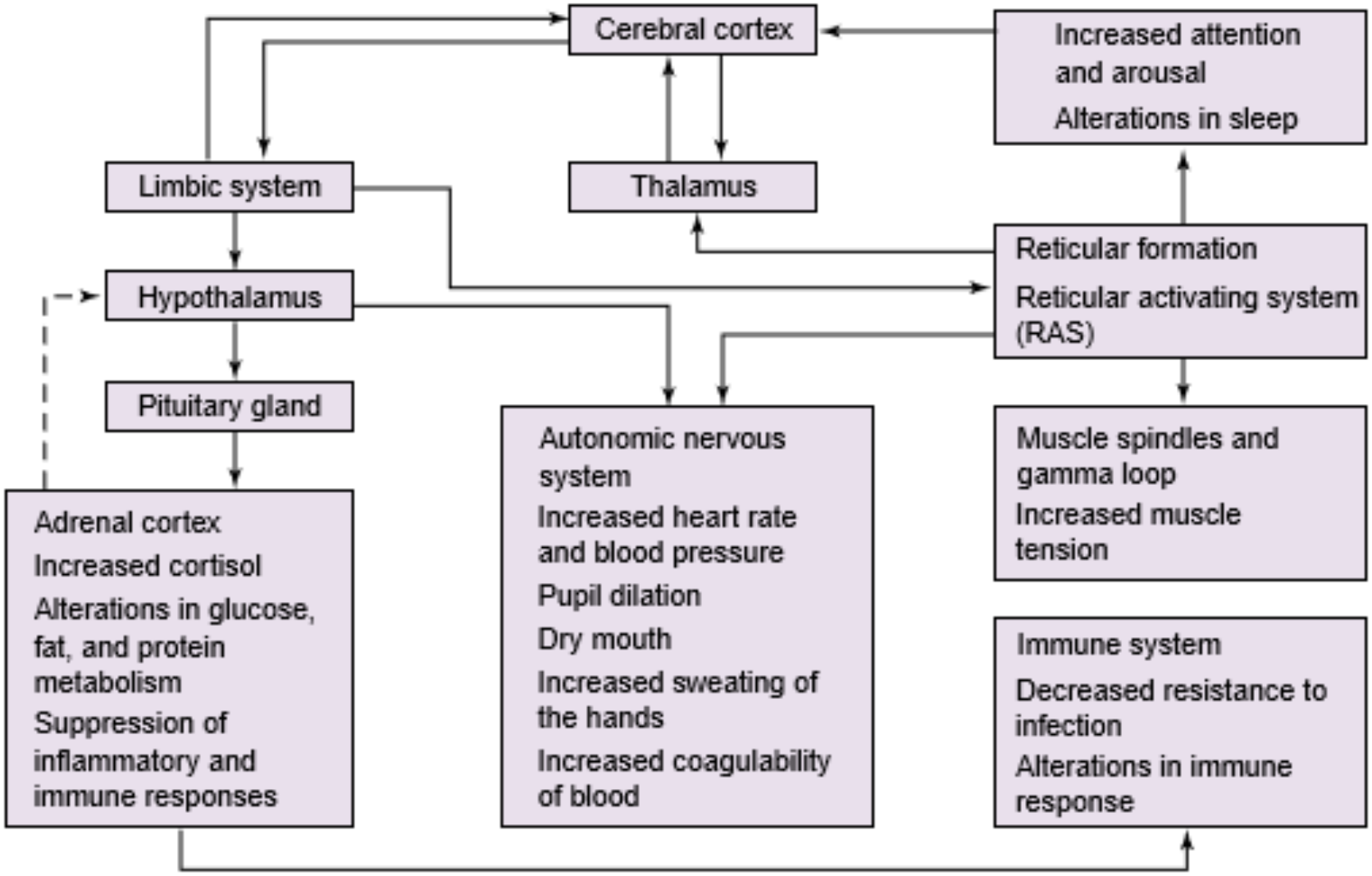
the general adaptation syndrome (GAS): general because the effect was a general systemic reaction, adaptive because the response was in reaction to a stressor, and syndrome because the physical manifestations were coordinated and dependent on each other

THE GAS INVOLVES THREE STAGES: THE ALARM STAGE, THE STAGE OF RESISTANCE, AND THE STAGE OF EXHAUSTION.

The alarm stage is characterized by a generalized stimulation of the sympathetic nervous system and the HPA axis, resulting in the release of catecholamines and cortisol.

During the resistance stage,the body selects the most effective and economic channels of defense. During this stage, the increased cortisol levels present during the first stage drop because they are no longer needed.

If the stressor is prolonged or overwhelms the ability of the body to defend itself, the stage of exhaustion ensues, during which resources are depleted and signs of “wear and tear” or systemic damage appear



■ **FIGURE 7-2** ■ Stress pathways. The broken line represents negative feedback.

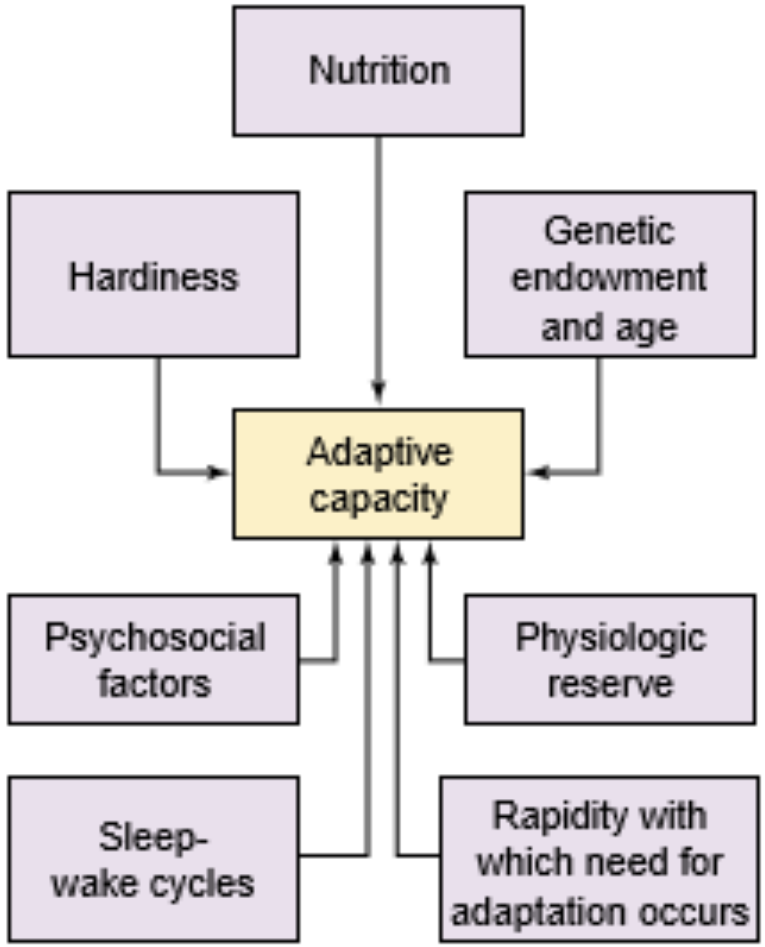
STRESS AND ADAPTATION

■ Stress is a state manifested by symptoms that arise from the coordinated activation of the neuroendocrine and immune systems, which Selye called the general adaptation syndrome.

■ The hormones and neurotransmitters (catecholamines and cortisol) that are released during the stress response function to alert the individual to a threat or challenge to homeostasis, to enhance cardiovascular and metabolic activity in order to manage the stressor, and to focus the energy of the body by suppressing the activity of other systems that are not immediately needed.

■ Adaptation is the ability to respond to challenges of physical or psychological homeostasis and to return to a balanced state.

■ The ability to adapt is influenced by previous learning, physiologic reserve, time, genetic endowment, age, health status and nutrition, sleep-wake cycles, and psychosocial factors.



■ **FIGURE 7-4** ■ Factors affecting adaptation.

The activation and control of the stress response are mediated by the combined efforts of the nervous and endocrine systems.

The neuroendocrine systems integrate signals received along neurosensory pathways and from circulating mediators that are carried in the bloodstream. In addition, the immune system both affects and is affected by the stress response. Adaptation is affected by a number of factors, including experience and previous learning, the rapidity with which the need to adapt occurs, genetic endowment and age, health status, nutrition, sleep-wake cycles, hardiness, and psychosocial factors.

For the most part, the stress response is meant to be acute and time limited.

Stressors can assume a number of patterns in relation to time. They may be classified as acute time-limited, chronic intermittent, or chronic sustained. An acute time-limited stressor is one that occurs over a short time and does not recur; a chronic intermittent stressor is one to which a person is chronically exposed. The frequency or chronicity of circumstances to which the body is asked to respond often determines the availability and efficiency of the stress responses. For example, the response of the immune system is more rapid and efficient on second exposure to a pathogen than it is on first exposure, but chronic exposure to a stressor can fatigue the system and impair its effectiveness.