



Stress and its Effects on the Brain and Body

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Introduction

Stress is defined as any intrinsic or exogenous stimulus that causes a biological response. Stress reactions are the compensating responses to various pressures. Stress can have a variety of impacts on the body, ranging from changes in homeostasis to life-threatening effects and death, depending on the nature, timing, and severity of the applied stimulus. Pathophysiological complications are common in many situations. People who work or live in stressful circumstances, for example, are more likely to develop a variety of diseases. Many diseases and pathological situations are made worse by stress, which can be a triggering or aggravating factor. We looked at some of the major consequences of stress on humans' primary physiological systems in this study [1].

Hormone receptors are only found in peripheral tissues, according to researchers, and they do not reach the central brain system. However, studies have shown that anti-inflammatory medicines (which are considered synthetic hormones) have an effect on behavioral and cognitive impairments, as well as phenomena known as "steroid psychosis [2]." Neuropeptides were first identified in the early 1960s as substances that had no influence on the peripheral endocrine system. Hormones, on the other hand, have been shown to have physiologic impacts on several regions of the CNS and play an essential role in behavior and cognition.

For the past 50 years, scientists have studied the impact of stress on the neurological system. Stress has been found in certain studies to have a variety of impacts on the human neurological system, including structural alterations in various areas of the brain. Chronic stress can cause the brain's mass to shrink and its weight to drop. Differences in stress response, cognition, and memory result from these anatomical changes. Naturally, the magnitude and intensity of the alterations vary depending on the stress level and duration of the stress [3]. Stress, on the other hand, is now well understood to produce structural changes in the brain, as well as long-term consequences on the neurological system. As a result, it's critical to look into the consequences.

Memory is one of the CNS's most significant functions, and it is divided into sensory, short-term, and long-term memory. The frontal and parietal lobes are responsible for short-term memory, whereas extensive portions of the brain are responsible for long-term memory. Declarative memory impairments can be caused by high levels of stress hormones. Stress has been found in animal experiments to cause a reversible loss of spatial memory due to hippocampal shrinkage. In reality, long-term exposure to high glucocorticoid plasma concentrations can cause hippocampal atrophy, which can contribute to memory problems. Additionally, patients with Cushing's syndrome (an increase in glucocorticoid secretion) or people who use high doses of exogenous synthetic anti-inflammatory medicines suffer hippocampal shrinkage and memory problems. MRI imaging of the brains of persons suffering from post-traumatic stress disorder (PTSD) revealed a decrease in the volume of the hippocampus, as well as neurophysiologic effects such as poor verbal recall.

During times of stress, memory is influenced by two elements. The first is noradrenaline, which is produced in the basolateral amygdala and is responsible for the emotional components of memories. Corticosteroids, on the other hand, aid this process. If corticosteroids are released a few hours early, the amygdala is inhibited, and associated behaviors are inhibited. There is a mutual equilibrium between the two hormones in memory process.

Memory is not always affected by stress. Under certain circumstances, worry can actually help you remember things. Non-familiarity, unpredictability, and life-threatening features of imposed stimulation are among these circumstances. Stress can temporarily boost brain function and, as a result, memory under these circumstances. In fact, it's been hypothesized that stress can help you remember things better.

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