THE PSYCHOPHYSIOLOGICAL NATURE OF STRESS

INTRODUCTION

The problem of human exposure to critical situations has attracted attention for a long time. Over past 30-40 years, interest in the phenomenon of stress, its mechanisms, and methods of adaptation to stressful conditions has gradually increased. 45% of all diseases are associated with stress and some experts believe that this figure is two times more. For example, referring to "Psychology Today", stress affects about 40% of Japanese teachers, a fifth of UK workers, and 45% of US workers ("Stress", n.d.). What is important, the majority of people do not even realize that they are in a constant state of stress. Therefore, this paper is to analyze and distinguish psychological and physiological aspects of stress, as well as its influence on the human health.

In scientific terms, stress is an unambiguous psychological condition, in which a person experiences a strong tension and excessive overstrain, preventing the body from revival and sometimes leading to depletion. Today, the concept of stress can be attributed to one of the categories of basic research, which has become the subject of study for the whole complex of disciplines: biology and medicine, physiology and psychology, management, demography, law, and even political science. In general terms, it can be defined as a natural adaptive reaction of a living organism to any event that occurs in the environment. Stress is a natural response and minor stress is inevitable and harmless, even helpful for the body, but excessive stress

reactions can cause inordinate problems for health.

BRIEF HISTORY

The history of stress research dates back to 1900 although its symptoms have been noted and discussed since ancient times. In the 18th and 19th centuries, such records became particularly frequent with active development of technology, economics, and science, leading to a growing pace of life. Profound studies of stress reactions began after American psycho-physiologist Walter Cannon discovered "fight or flight" reaction, i.e. automatic physiological reaction of the body to stressful situations. At the beginning of the 20th century, Canadian psychologist Hans Selye studied in detail all the symptoms associated with the "fight or flight" reaction. Subjecting rats to stressors, i.e. factors that can initiate the stress response, he identified specific changes occurring at the physiological level. He concluded that, regardless of the source of stress, the body always reacts the same way. Hans Selye first published his research results in a now classic book "The Stress of Life." According to Selye, stress response of the body broke into three stages and created the concept of general adaptation syndrome (GAS).

Subsequently, researchers also studied the effects of stress on the processes occurring in the body. Since then, diseases associated with stress and measures to avoid exposure to pathogenic conditions have become transparent. Among scientists studying stress condition, Stewart Wolf, for example, was the first to realize that stress affected the digestive function. Lawrence Leshan studied effects of stress on the development of cancer. George Engel clarified the relationship of stress and ulcerative colitis. Meyer Friedman and Ray Rosenman established a link between the experience of

stress and ischemic heart disease. Finally, Wolf and Wolff were studying stress and headaches.

Others have developed various ways to treat people whose diseases have emerged on the basis of stress. For example, Carl Simonton who claimed that people prone to cancer have a certain kind of personality added another component to existing standards of the psychotherapy procedure. It consisted in visualizing a successful outcome of the operation to remove a malignant tumor. Herbert Benson, a cardiologist, initially became interested in stress, studying transcendental meditation (TM) with Robert Keith Wallace. After Benson developed the technique of relaxation similar to the TM, it has been successfully used to treat people with high blood pressure. As a result, the new field of knowledge about changes in life to which people have to adapt and their impact on lives has appeared.

STRESS CONCEPT

General Adaptation Syndrome

Stress is not only tension in response to stressors; it is an adaptive response of the body. The most interesting aspect of stress peculiarities investigation is analysis of the process of stress response to extreme cart-action and adaptation to it. Such mechanism is called the general adaptation syndrome (GAS). Adaptation is a dynamic process in which mobile systems of living organisms, despite variability of conditions, maintain stability necessary for existence, development, and reproduction. This adaptation mechanism generated as a result of a long evolution provides the possibility of the human body adjustment to the constantly changing environment.

The process of adaptation preserves homeostasis (the ability to maintain a stable physiological state of the body) while interacting with the outside world. In this connection, adaptation processes include not only optimization of organism functioning, but also maintaining "body-environment" balance. The adjustment process begins whenever the "body-environment" system changes significantly and provides for the formation of a new homeostatic state that allows achieving maximum efficiency of physiological functions and behavioral reactions. Since the body and the environment are not in a static, but in a dynamic equilibrium, their ratio is constantly changing and, therefore, must continuously adapt to the carried-out processes.

The basic mechanism of stress is hormonal. The so-called classic triad forms the main morphological feature of GSA: expansion of the adrenal cortex, reduction of the thymus gland, and ulceration of the stomach. Selye compared these reactions with symptoms typical to almost any disease such as malaise accompanied by spilled pain and a feeling of aching joints and muscles, gastrointestinal disorders followed by the loss of appetite, and a decrease in body weight and combined them into a single system.

In terms of the GSA research, Selye also proposed to distinguish between "surface" and "deep" adaptation energy. The first one is available "on demand" and can be quickly restored by means of the second one or "deep". The latter is mobilized by adaptive adjustment mechanisms of the body. Its depletion is irreversible and leads to severe consequences such as aging and death. Following from two types of stress energy, there are also two types of stress reactions identified: short-term and long-term stress reactions.

Short-term stress is the beginning of full manifestation of prolonged stress. Under the action of stressors causing prolonged stress (and one may only

withstand relatively slack load), the onset of stress can be erased with manifestation of a number of adaptation processes. Therefore, short-term stress can be considered as the beginning of an enhanced model of prolonged stress. Although short-term and long-term stresses are different from each other in manifestations, they are based on identical mechanisms, but operated in different modes (with different intensity). Short-term stress is a rapid consumption of "surface" adaptation reserves and, along with it, the beginning of the "deep" one's mobilization.

Prolonged stress, in turn, is a gradual mobilization and expenditure of both "surface" and "deep" adaptive reserves. It can be hidden within, i.e. reflected in the change of adaptation parameters that manage to record only specific reactions. Maximum tolerated prolonged stressors cause symptomatic stress. Adaptation to such factors can be provided by the time to mobilize profound adaptation reserves, i.e. quickly "adapt" to the level of long-term extreme environmental requirements. Symptoms of prolonged stress recall initial general somatic symptoms and sometimes severe disease states. Such stress can go into the disease. The cause of prolonged stress can appear as the result of repetitive extreme factors. In this situation processes of adaptation and rehabilitation are alternately "disconnected".

Types

After numerous studies, the scientist has found four basic types of stress:

1. Physiological stress is immediate response (response) of the organism to sharp changes in the environment or exposure to a stimulus, usually of physicochemical nature (hunger, cold, lack of air, etc.);
2. Psychological stress is the reaction to emotional distress (anger, envy, resentment);

3. Structural stress or eustress is a positive form of stress when a person experiencing various stressful situations every day enhances adaptive capacity of the organism;
4. Destructive stress or distress is a pathological kind of stress syndrome, which has a negative effect on the body, mental activity, and human behavior. It destroys moral health and may even lead to a serious mental illness.

Stages

Describing the process of stress, three phases are distinguished. Reaction of anxiety comes immediately after exposure to a stressor and is expressed in the form of tension and sharp decrease in the body's resistance. There is excitement of the sympathetic nervous system; hypothalamus sends a chemical signal to the pituitary gland, making it enhance secretion of the adrenocorticotropic hormone (ACTH), which in turn falls in blood and causes secretion of adrenal corticosteroids (epinephrine and norepinephrine). Under the action of adrenaline, blood pressure, blood flow to muscles, and pulse increase, being accompanied by the decrease of blood flow in gastrointestinal tract, kidneys, etc. Hormones speed up the metabolism, blood clotting, and increase mental activity. Breathing becomes frequent and intermittent. Besides, in this phase, sugar concentration in the blood increases (hyperglycemia) and thymus (responsible for the immunity of the organism) is stressed. Bleeding sores appear in the gastrointestinal tract.

Changes occurring during this phase are functionally ambiguous and not always good for the body (for example, high blood pressure, which is a necessary component of the physiological mobilization, may lead to stroke or heart attack in case of some cardiovascular diseases). In general, these

changes prepare the entire body for action and possible anti-damaging factors.

During the resistance phase (stability phase), the secretion of corticosteroids (hormones that have a pronounced effect on the water-salt (mineralocorticoid), carbohydrate, and protein (glucocorticoids) exchange) increase, expressions disappear, and the body exhibits increased resistance (adapts) to the action of the stressor. This stage can last for months or even 15 - 20 years. Here, the body resources are fully activated. The adrenal glands begin to adapt and restructure. Cortisol provides the desired level of sodium required to maintain blood pressure and heart function. Practically, normal state of the body is maintained in terms of increased requirements for its adaptive systems. If stress continues for very long or very intensively, the stage of resistance can be transformed into the third stage.

Finally, a long and intense action of the stressor during resistance phase is replaced by an exhaustion phase, which is accompanied by a sharp decrease in the body's resistance, deterioration of its condition, and occurrence of various diseases. At this stage, as well as on the first one, body signals report about imbalanced stress responses and environmental requirements necessary to withstand stress. On the third stage, these signals lead to the disclosure of body reserves. Here, the body "cries" for help, which can only come from the outside either as support or in the form of the stressor removal. Mechanisms that transform the body in the phase of depletion resistance are still unknown.

PSYCHOLOGICAL ASPECTS OF STRESS

Stress may occur in certain situations for subjective reasons related to the specific nature of the individual. Generally, as individuals do not resemble each other, the factor of personality plays the vital role. For example, in the system "body-environment", the level of emotional intensity increases with increasing difference between conditions, under which mechanisms of the subject are formed and re-created. Thus, certain conditions cause emotional stress not because of their absolute rigidity, but because of non-compliance with these conditions of the individual emotional mechanism.

Any violation in the "man-environment" balance, the lack of mental or physical resources to meet individual's actual needs, or misalignment of the system needs become a source of anxiety. Anxiety is referred to as:

- feeling uncertain threats;
- diffuse sense of fear and suspense;
- indefinite anxiety.

Anxiety is the most strongly acting psychological mechanism of mental stress. This follows from the already mentioned feeling of threat, which, in turn, is a central element of anxiety and determines its biological value as a signal of trouble and danger.

Unlike pain, anxiety may play a protective and motivational role. Increased behavioral activity is associated with the emergence of anxiety, changing the nature of the conduct or inclusion of intrapsychic adaptation mechanisms. Nevertheless, anxiety can not only stimulate activity, but also contribute to the destruction of adaptive behavior patterns and their replacement by more adequate forms of behavior. Unlike pain, anxiety is a signal of danger, which is not yet implemented. Prediction of this situation is probabilistic in nature and ultimately depends on characteristics of the individual. This personal

factor often plays a decisive role; in this case, intensity of anxiety reflects individual characteristics of the subject rather than real significance of the threat.

Anxiety, being inadequate to situation in terms of intensity and duration, slows down and even precludes body adjustment and leads to inability of behavioral integration and general psychological disorders. Thus, anxiety is the basis of any changes in mental status and behavior caused by mental stress. There is an alarming sequence, which is an essential element of the mental adaptation process:

1. Sense of inner tension: it does not have a clear shade of threat, but only serves to signal its approach, creating a painful spiritual discomfort;
2. Oxypathial reactions: anxiety is growing; previously neutral stimuli acquire negative color; irritability increases;
3. Anxiety: it is the central element of the sequences. It is manifested in a feeling of uncertain threat. A characteristic feature is inability to determine the nature of the threat and to predict the time of its occurrence. Often, there is an inadequate logical processing, which results from the lack of facts providing incorrect conclusion;
4. Fear: it is anxiety concretized in a particular object. Although objects with which anxiety are associated may not be the cause, the subject creates an image that anxiety can be eliminated after certain actions;
5. A sense of impending disaster inevitability: the growth rate of anxiety disorders leads the subject to the submission to the impossibility of preventing the coming events;
6. Anxious timid excitement: alarming disorganization reaches a maximum and the possibility of purposeful activity disappears.

Anxiety, despite abundance of different semantic language, is a common phenomenon and is an obligatory mechanism of psychological stress. Any balance infringement appearing in the “body-environment” system activates adaptation mechanisms and at the same time with considerable intensity underlies the development of adaptation disorders. Increased anxiety causes inclusion or strengthening of intrapsychic adaptation mechanisms. These mechanisms may contribute to effective mental adaptation, ensuring reduction of anxiety and in case their inadequacy is reflected in the type of adjustment disorders, which corresponds to the nature of the emerging border psychopathological phenomena.

Effectiveness of mental adaptation directly depends on the organization of micro social interaction. When conflict situations occur in the family or industrial sector, difficulties in building informal communication due to violations in adaptation mechanisms occur much more frequently than with effective social interaction. It is also directly connected to adaptation to specific environment factors and their analysis or environment itself. Ranking personal qualities as an attracting factor in the vast majority of cases has been combined with effective mental adaptation. Conversely, assessment of the same qualities as a repulsive factor is connected with adaptation violations. Nevertheless, not only analysis of environmental factors determines the level of adaptation and emotional tension. It is also necessary to take into account individual characteristics, the state of immediate environment, and features of the social group.

POSITIVE SIDES OF STRESS

Usually, the term ‘stress’ is associated only with adverse external influences,

but this idea is far from the truth as a controlled and rare stress response may be useful for human body. Such type of stress is called eustress. Generally, the terms “eustress” stands for the stress reaction, which arises from positive emotions in circumstances leading to these and occurring in any other circumstances (perhaps in an emergency), but which nonetheless invokes the defense reaction. Positive stress is combined with positive emotions and mobilizes the body. Positive stress activates cognitive processes, as well as processes of self-awareness, understanding of reality, and memory. The person begins to move more actively in the social space and it does not harm other people, allowing not to get negative feedback and keep positive outcomes of stress.

Positive stress improves mood and has a positive effect on the body: it increases immunity, a person feels a surge of vitality, excellent look is assured, and the person feels the same way. If there is a uniform load of positive stress on the entire body, it will imply achievement of the task and the desire to perform even if it requires to change the body.

Overcoming stress, people become stronger and more confident. Stress can be a driving force that pushes an individual to advance in the chosen occupation, requires creation of better living conditions, and forces to settle the relationships and make creative changes in the world around. Stress can be considered as “irritation in the oyster that creates a pearl”. Difference between a failure stress and other forms of favorable stress lies in the person’s ability to control it.

CONCLUSION

Stress is the body's reaction to excessive tension, negative emotions, or just monotonous bustle. During stress, the human body produces the hormone adrenaline (epinephrine), making the body defend and seek for the way out. All individuals require stress in small amounts because it leads to the increased blood flow to the brain, i.e. makes one think. However, if stress reaction is too frequent, the body weakens and loses its strength and ability to solve problems.

Stress greatly affects human health in either good or harmful way. Stress reduces immunity and is the cause of many diseases (cardiovascular, gastrointestinal, and other diseases). It is therefore necessary to be able to resist the state of stress and ask for positive attitudes.