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REFLECTIVE ANALYSIS ARTICLE

REFLECTIONS ON THE INFLUENCE OF CHRONIC STRESS IN THE TRANSFORMATION OF HEALTHY CELLS IN CANCER CELLS

REFLEXÕES SOBRE A INFLUÊNCIA DO ESTRESSE CRÔNICO NA TRANSFORMAÇÃO DE CÉLULAS SAUDÁVEIS EM CÉLULAS CANCERÍGENAS

REFLEXIONES SOBRE LA INFLUENCIA DEL ESTRÉS CRÓNICO EN LA TRANSFORMACIÓN DE CÉLULAS SANAS EN CÉLULAS CANCEROSAS

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ABSTRACT

Objective: to discuss, from the reflexive analysis, the influence of chronic stress on the transformation of healthy cells into cancer cells. ***Method:*** a descriptive study, type reflexive analysis, from literature review. ***Results:*** it is known that there is a relationship between emotions and immune functions. The body reacts to receive stressful stimuli, triggering reactions of the nervous, endocrine and immune system. From there, to the activation of the hypothalamic-pituitary-adrenal axis occurs, which increases cortisol levels that, bound to receptors in the leukocytes, cause immunosuppression. A prolonged emotional stress gradually causes in the body chemical decreases able to conceive functional cell alterations. These cells that happen to behave abnormally and multiply in a disorderly way at a faster rate than normal cells, and can result in cancer cells. ***Conclusion:*** Chronic emotional stress can favor changes in the immune system and result in the proliferation of malignant cells. ***Descriptors:*** Oxidative Stress; Psychological Stress; Psychosomatic Medicine; Oncogenes.

RESUMO

Objetivo: discutir, a partir de análise reflexiva, a influência do estresse crônico na transformação de células saudáveis em células cancerígenas. ***Método:*** um estudo descritivo, tipo análise reflexiva, a partir de revisão de literatura. ***Resultados:*** sabe-se que existe uma relação entre as emoções e as funções imunes. O organismo reage ao receber estímulos estressores, acionando reações do sistema nervoso, endócrino e imunológico. A partir daí, ocorre a ativação do eixo hipotálamo-hipófise-adrenal, o que faz aumentar os níveis de cortisol que, ligado a receptores nos leucócitos, causa imunossupressão. Um estresse emocional prolongado aos poucos causa no organismo diminuições químicas aptas a conceber alterações celulares funcionais. Essas células passam a ter um comportamento anormal e se multiplicam desordenadamente numa velocidade mais rápida que as células normais, podendo resultar em células cancerígenas. ***Conclusão:*** o estresse emocional crônico pode favorecer alterações no sistema imunológico e resultar na proliferação de células malignas. ***Descritores:*** Estresse Oxidativo; Estresse Psicológico; Medicina Psicossomática; Oncogenes.

RESUMEN

Objetivo: discutir, a partir de análisis reflexivo, la influencia del estrés crónico en la transformación de células sanas en células cancerosas. ***Método:*** un estudio descriptivo, tipo análisis reflexivo, a partir de revisión de literatura. ***Resultados:*** se sabe que hay una relación entre las emociones y las funciones inmunitarias. El cuerpo reacciona para recibir estímulos, factores estresantes desencadenando reacciones del sistema nervioso, endocrino y sistema inmune. A partir de ahí, se produce la activación de las glándulas del hipotálamo-pituitaria-adrenal, lo que aumenta los niveles de cortisol, unido a receptores en leucocitos, causando inmunosupresión. Un estrés emocional prolongado causa gradualmente al cuerpo disminución química cambios funcionales celulares. Estas células que son conductas anormales y se multiplican desordenadamente a una velocidad más rápidamente que las células normales, pudiendo dar lugar a células cancerosas. ***Conclusión:*** el estrés emocional crónico puede favorecer cambios en el sistema inmune y resultar en la proliferación de células malignas. ***Descriptores:*** Estrés Oxidativo; Estrés Psicológico; Medicina Psicosomática; Oncongenes.

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INTRODUCTION

Cancer is not an isolated disease but a set of diseases with disordered growth of cells. These cells can spread through the body invading tissues and organs. They divide rapidly with a tendency to be aggressive and uncontrollable, forming tumors or malignant neoplasias. The human body can develop cancer from a variety of causes, both external and internal and / or interconnected. External causes are related to the environment, to social or cultural habits or customs. Internal causes are generally genetic and linked to the body's ability to defend itself against external aggression. Causal factors can interact and increase the chances of turning normal cells into malignant cells.[1]

Assuming that all the events that happen in our body are controlled by our brain, it has been discovered that many diseases, among them cancers, are inspected by specific parts of the brain, even linked to emotions. Numerous studies have already shown that cancer and other diseases are often preceded by traumatic events.[2]

The word stress, in itself, indicates "pressure," "persistence," and being stressed is to be under pressure or under the action of a persistent stimulus. It can be physical, psychological or mixed. Physical stress is almost always accompanied by a number of elements that generate physiological changes and may have emotional consequences, such as, pain. The psychological is the consequence that afflicts the subject psychically or emotionally such as change of address, ex officio, dilemmas in marriage, deaths, etc. The combination is the result of the meeting of the two already cited; Being, undoubtedly, the most usual of the three.[3]

Non-specific stress reactions are called SAG, the General Adaptation Syndrome. It is divided into three phases: alarm, resistance and exhaust. In the alarm reaction, the body receives the first action of the stressor and uses some mechanisms to maintain the balance; the body has no ability to solve the problem. In the phase of resistance, an adaptation developed through defense channels occurs. When the stressor remains in the body for a long time, an overload occurs and then the phase of exhaustion begins, where the corticoid production increases, and can result in serious health damage.[4]

Stress can still be classified as acute or chronic. The acute one ends soon after the absence of the stressor agent and the chronic one results in a longer period of time when the individual remains under the influence of the stressor. In this, the adequacy features are kept active for a long time.[5]

In acute stress, the organism undergoes physiological changes caused by our nervous system and back to the common, without great consequences. For example, primitive man, faced with danger, had a quick response to situations that put his life at risk: fighting or running away. The body underwent a modification of hormonal balance which, after the fight or flight, returned to the usual. Today, in modern society, the main problem is chronic stress, because it is common for people to suppress their feelings in the face of stressful situations, such as, traffic fights, boss problems, financial problems, family illness, etc. Impossible to return to the usual physiological state quickly after a conflictive situation and the response to the stressor stimulus is not relieved, triggering a cumulative process that leads to chronic stress, which is associated with a generalized suppression of cellular immunity. These cellular immune changes caused by stress, have a great impact on the immune response, making a person more vulnerable to some diseases.[6-7]

Slowly and gradually, almost imperceptibly, the balance of the organism can break. Prolonged emotional stress is gradually causing in the body chemical decreases capable of conceiving functional cellular changes that go beyond the limit between stress and disease.[5,8]

It is known that the changes caused by stress in the body result from the release of cortisol, the main hormone with modulating effect of the body's defenses. This hormone is produced by the adrenal glands and life is essential and one of its functions is to help in the maintenance of Normal levels of blood pressure, and, in the nervous system, is responsible for modulating excitability, influenced by the electrical activities of the neurons.[9-10]

During stress, there is an expressive increase of neutrophils, that is, leukocytes involved in the inflammatory response and a significant reduction of lymphocytes, that is, leukocytes involved in the regulatory and triggering phase of the immune response. Among lymphocytes, there is a significant increase in natural cell count killer (NK), that are important in immune surveillance. They take care that the appearance of tumors does not occur, they exert cytotoxic activity against tumor cells, they do not need prior recognition Of a specific antigen, being very effective in exterminating them and also exert functions to combat viral infections and,

when this occurs, these defense cells have, for example, the ability to multiply, increasing the chances of removing the infectious agent.[9,11]

In addition to the direct interference of stressful situations in the functions of the immune and endocrine systems, individuals in chronic emotional stress also show habits and customs that put them at imminent health risk, leading them to have more tendencies to obesity, diabetes and alcoholism. Studies show that a person's inability to cope with stress favors risky behaviors such as alcohol abuse and smoking, these habits, among many others also favor the onset of cancer.[12]

In view of the above, it is justified the need for studies that address stress as a predictor in the transformer mechanism of healthy cells in malignant cells. The discussion of this topic results in the diffusion of information about the stress and, can aid in the alertness and understanding of how the stress influences the cellular modifications in the organism, even alterations that lead to the appearance of malignant cells.

OBJECTIVE

- To discuss, from reflexive analysis, the influence of chronic stress on the transformation of healthy cells into cancer cells.

METHOD

Descriptive study, type reflexive analysis, developed from a bibliographical review narrative, which is elaborated from scientific articles and books, facilitating the junction of information for a better study and development of the work. The study had, as a guiding question, "How does chronic stress influence the transformation of healthy cells into cancer cells?".

The scientific articles were collected from January 2016 to May 2016. The following descriptors were used: Oxidative stress; Psychological stress; Psychosomatic Medicine; Oncogenes. The articles were selected in the homepage PubMed and the Scielo virtual page, in addition to publications of the Ministry of Health and INCA.

Only the articles available in full, in Portuguese or English, that had relevance to the theme and published between 2005 and 2016 were used for the development of this work. The others were excluded, except for older texts that were important for definition and understanding Of stress.

The study was divided in stages, for a better elaboration of the same. Thus, the first phase was the research of the desired articles; the second was the reading and analysis of the material, which allowed the identification of what would or would not be used, and the third phase was the assembly of the study in question, according to all the reflections carried out.

DISCUSSION

Stress results from the relationship between the individual and the environment. After an aggression, a reaction takes place and the individual's adaptive response to this reaction can be positive or negative. If there is no adaptation, a dysfunction occurs, which leads to temporary disturbances or to serious illnesses.[13]

Non-adaptation generates the need for the individual to deal with something that is threatening their internal balance. And if momentary resources are insufficient, due to personal frailty or fear of confrontation or even by the severity or intensity of the present stressor, the organism and individual can be affected with serious consequences for physical or mental health.

Authors point to a strong relationship between stress and illness. The chronicity of the stress response generates deficiencies in affective, behavioral and cognitive functions, increasing the risk for the development of diseases such as depression, diabetes, cardiovascular diseases, autoimmune diseases, upper respiratory infections and retardation in the healing process.[15]

Understanding the relationship between stress and cancer, makes it necessary to highlight how the onset of cancer occurs. The onset of cancer occurs slowly and can last for several years until a cancer cell spreads and gives rise to a visible tumor. There are three phases until these cells become a tumor, called: initiation, promotion and progression.[16]

In the initiation phase, cells affected by carcinogens undergo changes in some of their genes. At this stage, the cells are detected and genetically modified, but it is not yet possible to identify a tumor clinically. They remain "prepared", or "initiated" for the performance of another group of agents that will act in the next stage. In the promotion stage, the prepared or initiated cell is converted into a malignant cell, slowly and gradually. For this to happen, it takes a long and constant conviviality with the cancerous promoter agent. Interruption with promoters almost always ends the process at this stage. Some constituents of food and abundant exposure and long exposure to hormones are

examples of causes that promote the transformation of the initial cells into malignant ones. In the stage of progression, is the uncontrolled and unconverted propagation of transformed cells where the first clinical symptoms of the disease appear.[16] Chemical changes and mutations can influence and foster the actions of carcinogens.

In the physiology of tumors, it is observed that cells that underwent chemical changes have an abnormal behavior and multiply in a disorderly way and at a faster rate than the normal cells of the tissue, invading it. Most of the time, they form new blood vessels that will maintain them Nourished and growing. These cells clump together and form malignant tumors, while being able to detach themselves from these tumors, entering a blood or lymphatic vessel, they reach other, more distant organs. This invasion in other organs is called metastases.[17]

For a better explanation of these phases, it is understood that an irregular balance between the formation of free radicals and the ability to respond to the enzymatic arsenal of antioxidant protection of living organisms, leads to an imbalance in these cells. At this moment, the process of oxidative stress occurs, resulting in the excessive production of free radicals. Due to their "destructive potential", they may be involved in the initiation or acceleration of pathological processes, such as carcinogenesis, which is important in the physiology of tumors previously described [5]. In this way, chronic stress may be influencing this irregular balance of free radicals, leading to an imbalance in the cells, which may result in mutations that in future, on carcinogenic effect, may result in cancer.

In a stress situation, the physiological reaction is linked to two systems: the autonomic nervous system and the endocrine glands system, where the nervous system needs rapid stimulation and the endocrine gland system needs general action and prolonged effect. The explanation for this is the hormonal reaction of stressed stress, especially in the hypothalamic-pituitary-adrenal cortex axis, a group of cells of the hypothalamus releases a hormone of release or inhibition, called a factor, it is transported to the anterior lobe of the pituitary . The factor that will stimulate adenohypophysis will be the corticotropin releasing hormone (CRF). CRF will induce the adenohypophysis (gland that is part of the hypothalamus) to release the hormone adrenocorticotropin (ACTH) and stimulate the release of glucocorticoids by the adrenal glands to secrete cortisol.[18]

It is important to know that the exacerbated and prolonged release of cortisol is extremely harmful to the body, because when it binds to receptors present inside the leukocytes, it causes, in most cases, an immunosuppression.[9-10] Cortisol, as an indicator of stress, has been investigated more and more, understanding the need to control the effects of stress, aiming to improve the quality of life of individuals who suffer from it.[19]

During stress, an activation of the hypothalamic-pituitary-adrenal (HHA) axis occurs, which significantly increases the levels of cortisol, glucocorticoid released by the adrenal cortex. Glucocorticoids have an anti-inflammatory action during stress, reduce the production of interleukin (IL-2), an important cytokine secreted by T cells, which activates and induces cell proliferation; Inhibit the synthesis and secretion of other cytokines (including IL-1, IL-6, IL-8, tumor necrosis factor and interferon-g) responsible for the regulation of cellular immunity. In this way, individuals under chronic stress may have weaknesses of the immune system. The migration, distribution and localization of leukocytes by the organism are of extreme importance for the development of immune responses.[7]

Therefore, communication between emotions and immune functions can increase vulnerability to infectious diseases or malignant tumors. Upon receiving the stimulus of the stressor, the body reacts, triggering reactions in the nervous, endocrine and immune systems, through stimulation of the hypothalamus and limbic system, structures that make up the Central Nervous System (CNS). One of the basic functions of the CNS is regulation, which maintains the stability of the organism through several functions, one of which is the vegetative functions, that ensure its organization and functioning.[18,20]

It is emphasized that the emergence of certain diseases in one person, and not in others, depends on the individual differences that are determined by the person's life history and its vulnerabilities conditioned by genetics and its constitution.[21]

Cancer disrupts all the immunity and resistance of the body. Tumors grow when there is no efficiency of immunity processes. With the "unbalanced" immune system, the likelihood of developing the disease increases. As the immune system is also controlled by the limbic system, it is believed that the cancer patient presents a set of

psychosomatic elements. Research has already shown that not only the physical and biological side is important, but, also the psychological side, since, through this profile, psychic resistance and the willingness to fight against disease and in favor of life are evaluated.[23] Faced with this relationship between cancer And failure in immune processes, it is believed that chronic stress, as a negative influencer of the immune system, is a risk factor for the development of cancer cells.

It is important to prevent stress so it does not favor illness. The balance can happen with a positive mental attitude and with the accompaniment of a psychologist. The result will be the feeling of well-being and controlled situation. Accumulating emotional problems and / or social isolation can make a person feel sicker.[8]

It is important to set goals and objectives that can leave a person mentally and emotionally ready to regain health.[23] Actions such as physical activity, that releases serotonin, have a calming effect and cause a sense of well-being, decrease anxiety, and improve depression; Healthy lifestyle habits; Psychological counseling; Support from family and friends; Keep positive thoughts and good mood; Relax, plan and organize time, it is important to ameliorate the negative effects of stress.[24-5]

Important actions that contribute to better attention to people in situations of chronic stress. These actions can contribute significantly to minimize the degree of anxiety.[26] Important preventive and guidance actions are taken on the need to combat chronic stress such as avoiding Potential health damage.

CONCLUSION

t is known that prolonged traumatic events lead to chronic emotional stress. The brain carries the message that something is wrong and then reactions that result in decreased oxygen in the cells and the exacerbated release of cortisol, allow the body to become vulnerable, which can result in immunosuppression and cellular chemical changes. Such changes, under the influence of carcinogenic actions, may result in malignant cells.

It is important to note that physiological and emotional problems can influence chemical changes that led to mutated cells. If the stress problem is not treated, it can turn into a physical illness. The health professional should be prepared to understand this type of situation and can direct the patient to the appropriate treatment. It is necessary to improve habits through physical exercises, psychological accompaniment and leisure, so that the balance is recovered.

It is believed that further studies are needed to understand the relationship and changes that chronic stress may cause in cell mutations and the immune system as a way to better understand the stress theme and the appearance of cancer cells.

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