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Effects of Radiation on Physiological Hormones and Immune Proteins Associated with Cancer Antegens

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Abstract
Background. Radiation is an environmental factor that can lead to changes in the level of hormones in the body and to variables in the function of the body. The study examined the impact of radiation on certain hormones and vital indicators for understanding its physiological effects on human health.
Methodology. The study was carried out on two groups of non-smokers, non-alcoholics, and peaceful people with chronic diseases, and each group (40 blood samples) aged 20–6 years and 3–5 ml of blood were collected from each person. The decomposed samples were excluded to avoid erroneous results: the two groups were a non-irradiated group and an irradiated group. The level of prolactin hormone, cortisol hormone, colon cancer protein (CEA), and pancreatic cancer protein(CA19-9) was measured in both groups using MINDRY precision laboratory techniques and devices.
Results. Prolactin prolactin results showed a pronounced significant decrease in the irradiated group with the non-irradiated group. Cortisol: The results of the cortisol study showed a clear increase in people exposed to radiation compared to people who were not exposed to radiation. The results of colon cancer protein (CEA) and pancreatic cancer protein (CA19-9) showed a significant and clear increase in people exposed to radiation compared to people not exposed to radiation.
Conclusion. This study showed that radiation exposure negatively affects hormone levels and vital disease indicators in the human body. This study highlights the importance of systematic monitoring and complete preventive health care in individuals exposed to radiation to assess health risks.
Keywords: radiation, cancer, CEA, CA19-9, prolactin, cortisol.
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Влияние радиации на физиологические гормоны и иммунные белки, ассоциированные с раковыми антигенами

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Аннотация
Введение. Радиация представляет собой фактор окружающей среды, способный привести к изменению уровня гормонов и к функциональным изменениям в организме. Исследование предполагало изучение влияния радиации на отдельные гормоны и важные показатели для определения его физиологических последствий для здоровья человека.
Материалы и методы. Исследование было проведено в двух группах некурящих, не страдающих алкоголизмом спокойных людей с хроническими заболеваниями. В каждой группе людей в возрасте 20–6 лет (40 образцов крови) у каждого участника отбирали 3–5 мл крови. Испорченные образцы исключали во избежание получения ошибочных результатов. Две группы представляли собой группы необлученных и облученных людей. В обеих группах изучали уровень гормонов пролактина и кортизола, а также ассоциированного с опухолями толстой кишки карциноэмбрионального антигена (CEA) и ассоциированного с опухолями поджелудочной железы антигена CA19-9 с применением высокоточных лабораторных методов и оборудования MINDRY.
Результаты. Результаты исследования уровня пролактина продемонстрировали значимое снижение его уровня в облученной группе по сравнению с необлученной. Что касается кортизола, результаты исследования продемонстрировали заметное повышение его уровня у облученных людей по сравнению с необлученными. Результаты исследования ассоциированного с опухолями толстой кишки карциноэмбрионального антигена (CEA) и ассоциированного с опухолями поджелудочной железы антигена CA19-9 продемонстрировали значимое и явно выраженное повышение этих показателей у облученных людей по сравнению с необлученными.
Выводы. Исследование показало, что радиоактивное облучение отрицательно влияет на уровень гормонов и важные индикаторы болезни в организме. Исследование подчеркивает важность систематического мониторинга и оказания комплексной лечебно-профилактической помощи лицам, подвергшимся воздействию радиации, для оценки опасности для здоровья.
Ключевые слова: радиация, злокачественные новообразования, CEA, CA19-9, пролактин, кортизол.
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Introduction

Radiation has obvious and wide effects on the body and its organs, including changes in the level of hormones. Radiation exposure may lead to an increase in the levels of some hormones, such as the stress hormone(cortisol), and this is due to cellular stress [1]. It can cause disorders in the adrenal gland, leading to changes in the secretion of hormones [2]. In addition, radiation can cause cell damage, which leads to the release of hormones from damaged cells and an increase in the levels of vital signs, for example, CA19-9, and CEA [3]. It can lead to changes in body functions and hormonal balance, which affects general health and increases the risk of chronic and other diseases.

Prolactin: It is an important hormone in the female body. It is responsible for the secretions of the adipose gland, specifically the frontal lobe, which is naturally composed of amino acid chains and is closely linked to breastfeeding. It serves as a basic stimulator for the mammary glands to produce Prolactin. The hormones are released into the female body in relatively small quantities in both the uterus lining and mammalian glands, and the neuroendocrine function of the officer is to produce these glands by its position under the tumor, and the nerves of the arc nucleus use dopamine to trigger neurotransmitters to stop the screening of prolactin hormones in the pituitary gland. Increases in milk hormones. There are many positive complications [4].

Cortisol: Radiation has multiple effects on humans, and one of these effects is on the hormone cortisol, which has a role in psychological stress and regulating biological processes.

Research may indicate that radiation exposure can lead to an increase in hormone levels, including cortisol in the blood, as part of the response to radiation stress. Previous studies conducted by [5] on the eyes of mice showed that radiation exposure significantly increases the level of cortisol in the body, and this highlights the effect of radiation stress on the endocrine systems and the functioning of the glands. Radiation affects the pituitary gland, which is the main organ responsible for secreting the hormone cortisol. Also, another study conducted by [6] showed that radiation exposure can disrupt the functions of these axons, and lead to changes in cortisol regulation.

This disruption can lead to hormonal disorders affecting the ability of the body to deal with stress effectively. In addition, chronic radiation exposure can cause long-term changes in cortisol levels [7] Showed that workers in environments with continuous radiation exposure have abnormal cortisol levels, indicating cumulative effects of radiation on the hormonal system. There are several mechanisms through which radiation can lead to changes in cortisol levels. One of these mechanisms is oxidative stress, and this radiation can cause cell damage through the production of free radicals and leads to a stress response that increases the release of cortisol. In addition, radiation can affect the genetic expression of enzymes and proteins involved in cortisol production and regulation and can cause direct damage to the adrenal gland or other parts of the endocrine system.

Effects of radiation on CA19-9 and CEA

Radiation has multiple effects on biological processes in the human body, including the impact on levels of certain vital indicators used in cancer diagnosis and monitoring, such as CA19-9 and CAA. These indicators play an important role in monitoring the progress of the disease and the response of the body to treatment.

CA19-9 (Carbohydrate Antigen 19-9). CA19-9 is an anticarbohydrate used mainly as a vital indicator of pancreatic cancer and some other cancers, such as colon cancer and rectum. The effect of radiation on the level of the cancer antigen protein CA19-9 may have a multiple effect: an increase in CA19-9 as a result of stress. Studies indicate that radiation exposure may lead to a temporary increase in CA19-9 protein. This could be a result of cellular stress and radiation injury, and this could trigger a greater release of antigens from cancer cells or healthy cells damaged by radiation [8]. Control of the tumor response to radiation therapy: In the context of the radiation treatment of cancer, CA19-9 levels can be monitored to assess the tumor response to treatment. In some cases, the level of the CA19-9 hormone may increase temporarily after radiotherapy and cause the destruction of cancer cells and the release of their contents into the blood [9].

Carcinoembryonic antigen (CEA): It is a carcinoembryonic antigen and is used as a biomarker for a number of cancers, including colon cancer, rectal cancer, breast cancer, and lung cancer. The impact of radiation on CEA levels is reflected in several aspects: Increase in CEA levels as a result of tissue damage: radiation exposure can lead to a temporary increase in CEA levels, as a result of the release of antigens from damaged or dead cells. This answer is an indicator of tissue damage caused by radiation [9]. Assessing the tumor's response to radiotherapy: CEA is used after treatment produces a positive response and destroys the cancer cells and releases their content into the blood. However, this increase must be interpreted with caution and because of the full clinical context. [10].

Materials and methods

1. Estimation of prolactin hormone concentration.

The concentration of hormones was measured using the hormones Analyzer (from the Chinese company Mindray) based on the enzyme assessment technique alone (international/ml).

2. Estimation of cortisol hormone concentration.

The concentration of hormones was measured using the hormones Analyzer (from the Chinese company Mingray) based on the I.N.A. technology alone (international unit/mil).

3. Estimating an anti-cancer (CEA) concentration.

The concentration of the colon cancer antigen was measured using the hormones analyzer (from the Chinese company Mindray) based on the enzyme assessment technique alone (international unit/ml).

4. Pancreatic cancer analysis (CA19-9).

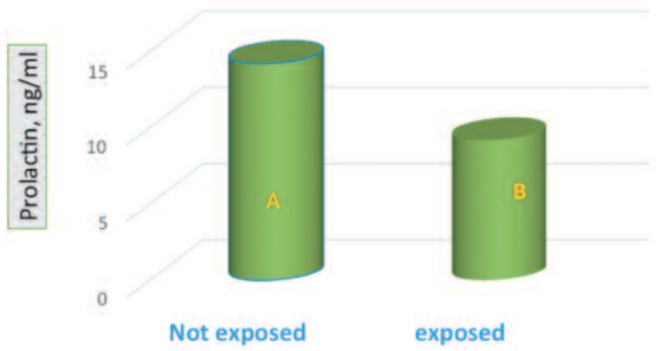
The concentration of the pancreatic cancer antidote was measured using the hormones Analyzer (from the Chinese company Mindray) based on the enzyme assessment technique alone (international unit/ml).

Results

1. Radiation effects on prolactin hormones. (Prolactin)

The results in Figure 1 showed a moral decline in the concentration of prolactin hormones at a probability level (p≤0.05) in the group of exposed persons compared with the group of non-irradiated persons, with the calculated average concentration of prolactin hormones in the group exposed to radiation (1.22±9.97) ug/L, while the calculated average concentration of prolactin hormones in the group of non-irradiated persons (2.32±14.23) ug/L.

Fig. 1. Effect of radiation on the hormone prolactin.

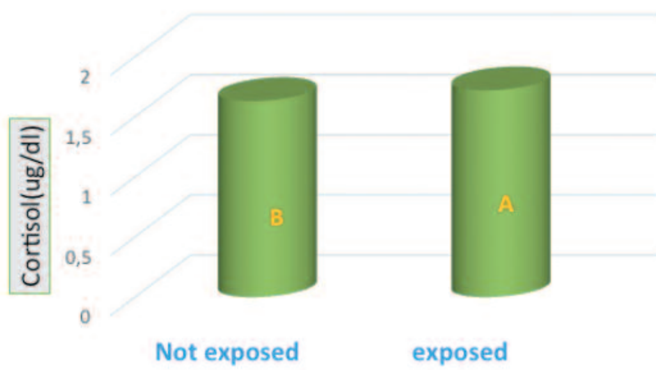


1. The values are expressed by the arithmetic mean ± standard deviation.
2. Horizontally different letters mean a significant difference at a probability level (p≤0.05).
3. The number of repetitions per set is (40) BIS

2. Radiation effect on cortisol hormones (Cortisol)

The results in Figure 2 showed a moral rise in cortisol hormone concentration at a probability level (p≤0.05) in the group of exposed persons compared to the group of non-irradiated persons, with the calculated average concentration of cortisol in the group exposed to radiation (0.12±1.72 ug/L), while the calculated average concentration of cortisol in the group of non-irradiated persons (0.11±1.63) ug/L.

Fig. 2. The effect of radiation on the hormone cortisol.



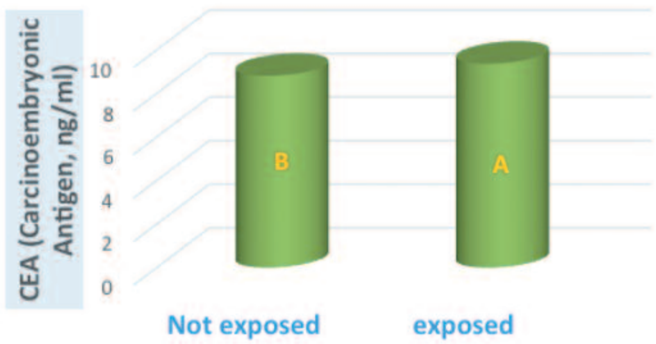
1. The values are expressed by the arithmetic mean ± standard deviation.
2. Horizontally different letters mean a significant difference at a probability level (p≤0.05).
3. The number of repetitions per set is (40) BIS.

3. The effect of radiation on proteins is an anticancer.

a. The colon cancer antidote. (CEA)

The results in fig. 3 showed a moral rise in the concentration of a pulmonary cancer protein at a probability level (p≤0.05) in the group of people exposed to radiation compared to the group of people not exposed to radiation, with the calculated average concentration of a pulmonary cancer protein in the group exposed to radiation (3.34±9.36 ng/ml), while the calculated concentration of a pulmonary cancer protein in the group of persons not exposed to radiation (1.16±8.8 ng/ml).

Fig. 3. Effect of radiation on coccyx antigen (CEA).



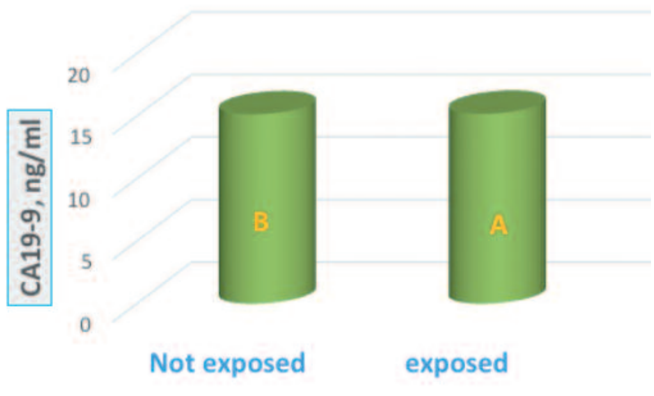
1. The values are expressed by the arithmetic mean ± standard deviation.
2. Horizontally different letters mean a significant difference at a probability level (p≤0.05).
3. The number of repetitions per set is (40) BIS.

b. Pancreatic cancer antidote 19-9. (CA19-9)

The results in fig. 4 show a moral rise in the concentration of pancreatic cancer 19-9 at the probability level (p≤0.05) in the group of people exposed to radiation compared to the group of people not exposed to radiation, with the calculated average concentration of pancreatic cancer 19-9 in the group exposed to radiation (2.78±15.17) alone, while the calculated average concentration of phalanx cancer was 19-9 in the group of people not exposed to radiation (1.60±15.13) alone/ml.

1. The values are expressed by the arithmetic mean ± standard deviation.
2. Horizontally different letters mean a significant difference at a probability level (p≤0.05).
3. The number of repetitions per set is (40) BIS.

Fig. 4. Effect of radiation on pancreatic cancer antigen (CA19-9).



Statistical analysis

Data were analyzed as a simple experiment by f-test and means were compared by Duncan's multiple range at the 5% level. The data were analyzed according to (samples not exposed to radiation and samples exposed to radiation) using SAS (Statistical Analysis System) and (EXAL) software for all variables. Pearson correlation was also analyzed for all variables using SPS.

Discussion

1. The effect of radiation on prolactin hormones. The results were consistent with a study conducted by the researcher [11], which considered the effect of radiation on prolactin hormones, and the previous study indicated that radiation exposure leads to a moral decline and a pelvis in the concentration of prolactin due to the effect of radiation on the vegetative gland cells. One possible cause for the researcher [11] is that radiation can cause damage to pituitary gland cells, which are responsible for the production of prolactin hormones. The damage to these cells reduces the production of prolactin hormones. Biologically speaking, radiation exposure leads to an increase in the level of oxidizing stress and inflammation in the body, which negatively affects the function of the pituitary gland and other glands [12]. Radiation affects the balance of other hormones in the body, which may indirectly lead to a decrease in prolactin hormone concentration [13]. Radiation can weaken the immune system, which can affect endocrine function and thus affect the level of prolactin [14]. The results also showed that the radiation's impact on reproductive function was derived from the study of the effects of radiation accidents on society. However, there are few reports of reproductive function after radiation accidents because radiation doses are not well known and their effects on fertility are rarely reported. However, data can be deduced from the known consequences of therapeutic irradiation and deliberate experimental exposure. Skull irradiation may lead to damage to the central nervous system, including the primitive gland axis, leading to early puberty, hyperbolicity, and a lack of gland vector. Abdominal irradiation, tub, spine, or testicles may directly affect the reproductive gland, leading to infertility and poor sexual steroid production [15].

2. Radiation effect on cortisol hormone. These results are in line with a study [16] on the impact of radiation on cortisol levels. The study indicated that radiation exposure results in an alarming increase in cortisol hormone concentration due to stress effects and associated physiological changes. The high levels of cortisol in exposed persons can be interpreted as the body's response to the stress caused by radiation exposure. Cortisol is a hormone produced in the adrenal cortex and plays an important role in regulating the stress response. When the body is exposed to radiation, cortisol is increasingly released as part of the stress response to deal with the harmful effects of radiation on cells and tissues. This could lead to high cortisol levels in the blood. The results of the study are consistent with those of [17], which confirmed that radiation exposure could lead to increased cortisol levels in the blood. This study found that cortisol has a moral increase in people exposed to radiation compared to non-exposed persons, which reinforces the assumption that radiation exposure causes a stress response that increases cortisol release. From biological explanations, radiation can lead to increased levels of biological stress, prompting the adrenal gland to release more cortisol to cope with stress [16]. Through hormonal explanations, radiation exposure can affect the body's hormone balance, leading to increased cortisol release [18]. And from the immune effects, radiation can affect the immune system, which can increase cortisol release as part of the body's response to stress [19].

3. Radiation effect on CEA, CA19-9. These results are consistent with [20] which indicated that radiation exposure leads to DNA damage and increased genetic expression of cancer-related proteins. These results are consistent with [21] which indicated that radiation exposure could increase the level of pancreatic cancer by 19.9 due to genetic changes caused by radiation. Several studies have shown that high levels of CA19-9 after radiation can be an important predictive indicator of survival in cases of locally advanced pancreatic cancer. For example, pancreatic cancer patients with lower-than-average levels of CA19-9 after radiation treatment had longer survival rates than those with higher levels. In addition, another study found that the high levels of CEA and CA19-9 after co-treatment were associated with short sickness and general survival in straight colon cancer patients. Researchers have found that levels of these tumors can provide early detection time for relapse compared to traditional methods, thus enhancing the value of continuous surveillance using these post-treatment markers and such studies to study them [22].

Conclusion

Based on our study, the results were a clear moral decline in prolactin hormone, a clear moral rise in cortisol hormone, and an anti-CEA, CA19-9. These results suggest that radiation exposure has a significant and obvious impact on certain hormones and vital indicators, which have implications for human health and also have a clear environmental impact.

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