

characterized by down regulation in energy utilization, attenuated level of contractile function, upregulation of stress proteins, cardiomyocyte dedifferentiation and by myocyte remodeling. Morphologically, chronic hypoperfusion results in loss of myofilaments, increased amount of glycogen and small dark mitochondria, typical signs of *hibernating* myocardium.

Protection of normal tissue against radiation-induced damage may increase the therapeutic benefit of radiotherapy. Different more or less effective measures to prevent radiation-induced injury and to increase cardiovascular tolerance to irradiation of healthy tissue have been evaluated. Further investigation is needed to determine the most effective prevention of radiation injury to healthy tissues accidentally targeted by radiation.

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### SURGICAL COLLABORATION WITH SEMIPALATINSK (KAZAKHSTAN) AND NAGASAKI (JAPAN) FOR 10 YEAR EXPERIENCE

**Abstract:**

Background: From 1949 to 1989, 456 nuclear tests were conducted by the former Soviet Union at the Semipalatinsk Nuclear Test Site (SNTS) in Kazakhstan. Exposure was primarily from the first test in August 1949, that affected the northern Semipalatinsk regions, a plutonium bomb in 1951, and a thermonuclear-bomb test in 1953, that affected the Semipalatinsk region southeast of the SNTS. A noticeable increase in the number of cases of Hashimoto's thyroiditis and thyroid cancer were reported. It is very important to assess the clinical behavior of thyroid cancer which may be affected by SNTS in the control of an accurate diagnosis and standardized surgery. We have collaborated with the Semipalatinsk Oncology Center since 1999, in order to establish an optimal method to diagnose and perform a thyroidectomy and a lymph node dissection for the patients with papillary thyroid cancer that is better suited for the Semipalatinsk environmental effects. Every year, SM visited Semipalatinsk Oncology Center from 1999 to 2009 to have some lectures and operations with local physicians and surgeons.

**Objective:** To assess the change of diagnostic accuracy and thyroid surgery from 1999 to 2009 in Semipalatinsk Oncology Center in collaboration with Nagasaki University and Nagasaki Medical Center.

**Material:** A total of 169 patients with thyroid cancer who underwent thyroid surgery at the Semipalatinsk Oncology Center were evaluated. From the 169 patients, 125 patients with papillary thyroid cancer were assessed for surgical procedure.

**Method:** This was a cross-sectional observational study.

**Results:**

1. Before 2001, there were few preoperatively diagnosed thyroid cancers and from 2002, preoperatively diagnosed papillary cancers increased.

2. From 1999 to 2001, there were no thyroid surgeries with cervical lymph node dissections. The partial lobectomies were mainly performed until 2001. From 2002, total lobectomies were chosen for the majority of the patients, but total thyroidectomies were rarely performed. The lymph node dissection was added occasionally, but rarely.

**Conclusion:** The optical method to diagnose thyroid tumor was performed, and an accurate diagnosis of thyroid cancer changed the surgical procedure during the period of this study. An accurate diagnosis and standardized surgery for thyroid cancer helped to evaluate the biological characteristics of thyroid cancer which may be affected by SNTS in next decade.

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### NANOPARTICLE ENHANCED X-RAY THERAPY OF CANCER

**Abstract.** Nanomedicine is the use of nanoparticles in medical practice, and can refer both to classical procedures improved using nanoparticles or entirely new techniques developed to exploit certain nanoparticle behaviors in the body. Nanophotothermolysis and nanophotothermia are two new techniques which exploit the strong light absorption properties of nanoparticles to generate heat in a small localized region. Conjugating nanoparticles with various biomolecules allows for targeted delivery to specific

tissues or even specific cells, cancerous cells being of particular interest. Previous studies have investigated nanoparticles at visible and infrared wavelengths where surface plasmon resonance leads to unique absorption characteristics. However, issues such as poor penetration depth of the visible light through biological tissues limits the effectiveness of delivery by noninvasive means. In other news, various nanoparticles have been investigated as contrast agents for traditional X-ray procedures, utilizing the

strong absorption characteristics of the nanoparticles to enhance contrast of the detected X-ray image. Using X-rays to power photo-thermal therapies has three main advantages over visible-spectra wavelengths: the high penetration depth of X-rays through biological media makes non-invasive treatments very feasible, the high energy of individual photons means nanoparticles can be heated to desired temperatures with lower beam intensities, and X-ray sources are already common throughout the medical industry making future implementation on existing

equipment possible. This paper uses generalized Lorenz-Mie theory to investigate the light absorption properties of various size gold nanoparticles over photon energies in the 1-100 keV range. These absorption values are then plugged into a thermal model to determine the temperatures reached by the nanoparticles for X-ray exposures of differing time and intensity. The results of these simulations are then discussed in relation to the effective implementation of nanophotothermia and nanophotothermolysis treatments.

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### **STUDYING A FREE RADICAL OXIDATION OF AN ORGANISM IN THE REMOTE PERIOD AT THE COMBINED INFLUENCE OF $\gamma$ -RADIATION AND ASBEST DUST**

The purpose of research: Study in experiment of free radical oxidation role in epinephros texture and immuno-competent organs and organule; in the remote period at the combined influence of gamma radiation (6Gr) sub lethal doze and chrysotile-asbestos dust in experiment.

The results of investigation and discussion. How appointed investigations on influence of asbestos dust concentration of DC is increased in lymphocytes peripheral blood since  $0,29 \pm 0,03$  from  $0,37 \pm 0,03$  ( $p < 0,05$ ), thymus since  $0,49 \pm 0,03$  from  $1,07 \pm 0,06$  ( $p < 0,001$ ). At animals after dust radiations influence concentration DK in lymphocytes peripheral blood exceeded controls means in 1,3 time ( $p < 0,05$ ). In thymus is noted tendencies to exceed ( $p > 0,05$ ) on compare with a control index. By comparison with second course noticed reduction in 2 time ( $p < 0,001$ ).

The level of DK an animals adrenal after becoming dusty are reduction since  $1,19 \pm 0,11$  from  $0,69 \pm 0,06$  ( $p < 0,01$ ), but in spleen it increases since  $1,28 \pm 0,20$  from  $1,93 \pm 0,13$ , that is nearly in 1,5 time on compare with index to I group ( $p < 0,05$ ). At animals III group, had undergoes combined influence from spleen side essentially change didn't noticed, where maintenance DK almost corresponded with control size, level of DK in adrenal is reduction since  $1,19 \pm 0,11$  from  $0,58 \pm 0,04$  ( $p < 0,001$ ).

Investigation of first product of free radical oxidation in the livers and in lymph nodes appointed, that maintenance DK in liver is increased since  $0,69 \pm 0,05$  from  $1,68 \pm 0,05$  ( $p < 0,001$ ), in lymph nodes since  $0,35 \pm 0,03$  from  $0,98 \pm 0,09$ , in exemplary fashion in 2,8 time ( $p < 0,001$ ). Concentration of DK in III groups animals liver is increase on 55% ( $p < 0,01$ ), in lymph nodes is increase on 91% ( $p < 0,01$ ).

Had come results is concerning about that, that at influence of dust radiation and dust factors is active free radical oxidation, as possible it associated with reduction of activity antioxidation ferment in most learning organs. Under the influence asbestos dust in lymphocytes of peripheral blood and in the liver the contents of MDA remained at the level of control magnitude ( $p > 0,05$ ). In combined exposure in lymphocytes of peripheral blood level of MDA was increased to 2,2 times ( $p < 0,05$ ), in the tissue of the liver about 1,8 times ( $p < 0,001$ ) in comparison with the second group the level of MDA in lymphocytes of peripheral blood increases to 1,7 times ( $p < 0,05$ ), and in the tissue of the liver 56% ( $p < 0,001$ ).

Authentic increase of the contents of the given index was marked in lymphatic gland as with  $0,051 \pm 0,004$  to  $0,11 \pm 0,01$  ( $p < 0,001$ ) and in the II group, to  $0,14 \pm 0,01$  ( $p < 0,001$ ) in the III group; in thymus from  $0,031 \pm 0,003$  to  $0,14 \pm 0,02$  ( $p < 0,001$ ) in the II group to  $0,12 \pm 0,01$  ( $p < 0,001$ ) in the III group; in the tissue of adrenal glands from  $0,031 \pm 0,004$  to  $0,08 \pm 0,01$  ( $p < 0,01$ ) in the second group  $0,11 \pm 0,02$  ( $p < 0,05$ ) in the III group. In the tissue of the spleen was marked of the contents of MDA from  $0,32 \pm 0,03$  to  $0,18 \pm 0,01$  ( $p < 0,01$ ) in the 2<sup>nd</sup> group and in the (III) third group was marked the increase till  $0,39 \pm 0,01$  ( $p < 0,05$ ).

Conclusions. Thus, given index chow, that in 90 days which correspond to the periods of remote consequence, when rats are affected by combined gamma-radiation 6Gr and chrysotile of asbestos dust the contents of DK and MDA increase in the lymphatic peripheral blood and in the cells of lymph nodes of intestine, thymus and liver. The continuation of the investigation which dedicated to the studying of remote effects combined exposure of ionized radiation and factors of environment on public health and holding of measures on liquidation of after-effects.