

**DESTRUCTIVE PROCESSES IN THE CARDIOVASCULAR SYSTEM UNDER THE  
ELECTROMAGNETIC RADIATION ACTION**

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**ABSTARCT:**

We examined 119 people from 18 to 65 years old, professionally associated with exposure to radio frequency electromagnetic radiation (RFEMR) and various work experience.

All subjects were divided into 6 main groups, depending on the service length, under systematic long-term conditions (up to 6 hours a day) RFEMR exposure to radio television stations (RTS) of the Republic of Uzbekistan.

It has been established that the immune status dynamics and antigen-binding lymphocytes, specifically sensitized to tissue heart and blood vessels antigens, are the adverse effect reflection of electromagnetic radiation on the human

body, which, with an increase in this effect duration, takes on a deeper and irreversible character, which is consistent with other authors' data.

**KEYWORDS:** immunity, lymphocyte binding antigen, heart, electromagnetic radiation.

**RELEVANCE:**

In recent years, the electromagnetic radiation influence problems of the radio frequency range on the human body have been discussed by various specialties scientists, in particular at the annual international conferences and symposia held by the European Bioelectromagnetic Association and the Bioelectromagnetic Society. However, despite the large number studies carried out to study the electromagnetic radiation biological

effect of radio frequency range, the human and animal organism cannot yet unambiguously answer the questions about this effect degree and nature. [5]

At present, enough data have been accumulated indicating the electromagnetic radiation negative effect on the immunological organism reactivity. The studies' results by various scientists give reason to believe that when exposed to electromagnetic radiation, the immunogenesis processes are disrupted, more often in their oppression direction [2,3,4]. In connection with the above, we also made an attempt to study the immunological reactivity and the human cardiovascular system state during prolonged occupational exposure to electromagnetic radiation in the radio frequency range.

The study aim was to study the antigen-binding lymphocytes level to tissue antigens of the pericardium, endocardium, myocardium, as a prognostic criterion of the degree and damage depth to the cardiovascular system in individuals, exposure occupational risk, taking into account service length at a radio television station.

#### **MATERIAL AND METHODS:**

In total, 119 persons aged 18 to 65 were examined. Depending on the exposure duration to electromagnetic radiation of the radio frequency range, the subjects were divided into 6 main groups:

Group I (15 people) worked under systematic long-term (up to 6 hours a day) exposure for up to 5 years.

Group II (17 people) - work experience 6-10 years

Group III (25 people) - work experience 11-15 years

Group IV (24 people) - work experience 16 - 20 years

Group V (18 people) - work experience 21 - 25 years

In the VI group of persons (10 people), the work experience was more than 25 years.

The control was the 22 healthy volunteers' analysis results of the same age, not associated with direct exposure to electromagnetic radiation of the radio frequency range (engineers, administrative workers, accountants, cleaners, etc.).

The observed persons had a higher or secondary technical education and held various positions (engineers, electricians, electromechanics and antenna masts), which were in the same working conditions. The energy flux density at the commissioning sites was  $24 \mu\text{W}/\text{cm}^2$  (the norm is  $16.7 \mu\text{W}/\text{cm}^2$ ), which exceeds the maximum allowable EP level by 43.71%. In this case, the range of electromagnetic radiation was 650-800 MHz. The work schedule of the observed persons was shiftable with 12 hours working time a day.

During the initial visit, all patients underwent immunological studies along with general clinical analyzes, including determining the multiple organ lesions degree, and determining the level of antigen-binding lymphocytes to tissue the pericardium, endocardium, and myocardium antigens [1].

Antigen-binding lymphocytes determination was carried out according to Garib F.Yu and etc. method, 1995 using specific tissue antigens of various organs [1].

#### **THE OBTAINED RESULTS AND THEIR DISCUSSION:**

Comparative analysis of obtained data for determining the antigen-binding lymphocytes level to pericardium tissue antigens in the 1st group examined persons, where the work experience was up to 5 years, shows an increase to 5.19 times relative to the control values ( $4.93 \pm 0.42$  and  $0.95 \pm 0.26\%$ , respectively,  $P < 0.05$ ), in group 2 - 7.24 times ( $6.88 \pm 0.44$  and  $0.95 \pm 0.26\%$ , respectively,

P<0.05), in group 3 - by 7.33 times ( $6.96 \pm 0.49$  and  $0.95 \pm 0.26\%$ , respectively, P<0.05), in group 4 - 7.89 times ( $7.50 \pm 0.48$  and  $0.95 \pm 0.26\%$ , respectively, P<0.05), in group 5 - in 8.54 ( $8.11 \pm 0.30$  and  $0.95 \pm 0.26\%$ , respectively, P<0.05) and in group 6, where work experience is more than 25 years, antigen-binding lymphocytes indicators, specifically sensitized to pericardium tissue antigens, exceed the control values by 9.32 times ( $8.85 \pm 0.44$  and  $0.95 \pm 0.26\%$ , respectively, P<0.05). Increasing in proportion to the service length on RTS, the antigen-binding lymphocytes level to pericardial tissue antigens in group 2 ( $6.88 \pm 0.44\%$ ), significantly differing from the values in the control ( $0.95 \pm 0.26\%$ ), significantly differs from the values in 1 group ( $4.93 \pm 0.42\%$ ), the antigen-binding lymphocytes values to tissue antigens of the pericardium continue to increase in group 4 ( $7.50 \pm 0.48\%$ ) and 5 ( $8.11 \pm 0.30\%$ ) and, in their turn, significantly differ from the 1, 2 and 3 groups values. This indicator level in group 6 ( $8.85 \pm 0.44\%$ ) also significantly exceeds the values in group 4, which convincingly and unequivocally suggests that with an increase in the work duration on the RTS, pathological changes in the pericardium become quite profound.

The indicators dynamics of antigen-binding lymphocytes to tissue the endocardium, myocardium and vascular walls antigens had the same dependence on the exposure duration to electromagnetic radiation in the radio frequency range, as the antigen-binding lymphocytes values to tissue the pericardium antigens. The antigen-binding lymphocytes level specifically sensitized to tissue the endocardium, myocardium and vascular walls antigens in all examined individuals groups was significantly higher than the control values. But, if in the group with a work experience up to 5 years, the antigen binding lymphocytes to tissue the

endocardium antigens ( $5.40 \pm 0.46\%$ ) exceeded the normal values by 5 times, then in 4 ( $9.25 \pm 0.40\%$ ), in 5 ( $9.83 \pm 0.34\%$ ) and 6 ( $11.55 \pm 0.53\%$ ) groups, they were respectively higher already in 8.49; 9.02 and 10.60 times.

Comparative analysis increase multiplicity in antigen-binding lymphocytes to tissue the myocardium antigens and the corresponding antigen-binding lymphocytes values to tissue pericardium, endocardium antigens showed that in group 1 patients (work experience up to 5 years) it has the least value - 3.07 times relative to the control, while pericardium - 5.19 times, endocardium - 4.95. With an increase in the work duration at the radio television station, an increase in the antigen-binding lymphocytes indicators to tissue myocardium antigens is also observed, but the increase frequency is still lower than the corresponding antigen-binding lymphocytes values to tissue other organs antigens (pericardium, endocardium,). Thus, in group 2 - 4.9 (7.24; 5.99; 5.2; 5.15 times, respectively), in group 3 - 5.4 times (7.33; 6.31; 5, 8 and 5.73 times, respectively), in group 4 - 7.5 (7.90; 8.48; 6.88 and 6.98, respectively), in group 5 - 7.6 times (8.54 ; 9.01; 7.58 and 7.74 times, respectively) and in group 6, where work experience more than 25 years - 8.2 times (9.32; 10.60; 8.18 and 7.90 times , respectively).

Thus, the studies carried out and the results obtained for determining the antigen-binding lymphocytes values, specifically sensitized to tissue the heart and blood vessels antigens, directly reflecting the pathological process level in the organs, show the damage degree as exposure result to electromagnetic radiation of varying intensity, depending on work duration at the radio television station. Significant differences in indicators that are already observed in group 1 patients, where work experience is less than 5 years, indicate significant changes in organs, a functional

nature possibly, since patient complaints and objective examination data are a transient nature, which is also confirmed by fluctuations antigen-binding lymphocytes to tissue the pericardium, endocardium, myocardium antigens, within the group. So, the upper antigen-binding lymphocytes values in group 1 to tissue pericardium antigens are in 2 persons - 8%, the minimum - in 3 - 3%; to tissue myocardium antigens - maximum - in 1 patient - 6% and minimum - within normal limits - in 6 persons; endocardium - respectively - in 1 - 9% and in 2 - 3%.

The obtained results of antigen-binding lymphocyte dynamics, specifically sensitized to tissue heart tissues antigens, are the adverse effects electromagnetic radiation reflection on the human body. With an increase in this effect duration, the revealed violations take on a deeper and irreversible character. This fact should be taken into account and regular preventive examinations should be carried out using as a diagnostic and prognostic criterion the antigen binding lymphocytes determination level to tissue organs and tissues antigens, for early detection of multiple organ lesions foci and approaches optimization to therapy and these lesions prevention.

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