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Chronic Lymphocytic Leukemia and Non-Ionizing Radiation-Case Report

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Abstract

During past years we are faced with new forms of energy. The influence of non-ionizing radiation on human health is still not well understood. As a preventional field of medicine, occupational medicine has a problem to detect correlation between disease and workplace hazard.

The aim of this case report is to consider a possible occupational disease-chronic lymphocytic leukemia (CLL) caused by non-ionizing radiation. The conclusion is that CLL, in the most of cases, can not be correlated to non-ionizing radiation exposition. In this case report we couldn't declare chronic lymphocytic leukemia as an occupational disease.

Key words: chronic lymphocytic leukemia, non-ionizing radiation, occupational disease

1. Introduction

During past years we are faced with new forms of energy. The media inform us about electromagnetic field (radio frequency field) which may cause cancer. But those information are not scientifically supported. We know that ionizing radiation has carcinogenic effect but the influence of non-ionizing radiation on human health is still not well understood. Different insitutions are investigating two forms of cancer in humans (child leucemia and chronic lymfocite leucemia among adults). As a preventional field of medicine, occupational medicine has a problem to detect correlation between disease and workplace hazard.

2. Objective

The aim of this case report is to consider a possible occupational disease-chronic lymphocytic leukemia (CLL) caused by non-ionizing radiation.

3. Methods and results

Patient Dj. A., 42 years old, is meteorological technician with 24 years total work time period at Hydro-meteorological Service of Serbia in Krusevac. He has been hospitalised at Institute of Occupational Health for invastigation of a potential occupational disease and for his ability to work. He has been complaining of swelling and pain in armpits, the neck, the groin and enlarged lymph nodes in these area, left costal arch pain and the pain on the left side of the chest behind the breastbone, shortness of breath and wheezing, headache, occasional dizziness, stuffy nose and difficulty in swallowing.

During physical examination we noticed enlarged lymph nodes (in the neck, the armpits and groin). Because of these simptoms and signs, he complained to his physician in august, 2009. A year later, the chronic lymphocite leucemia has been diagnosed. Then, he was followed up for about 10 days at the Institute of Occupational Health of Serbia, and the treatment there after was continued at the Clinique of haematology, Clinical Center of Serbia. Also, he is insulin dependent diabetic with hypertension, chronic back pain, and disorder of adaptation to new circumstances. No similar diseases (the same disease) didn't occur in his family.

Citogenetic evaluation has shown low expected mitotic index. Unstable chromosomal aberrations, on 50 metaphase chromosomes, have not been detected. But isochromatide and chromatide lesions have been detected. Micronucleus test is negative (9 micronucleuses per 750 binuclear lymphocytes).

Also leucocytosis ($22,2 \times 10^9/L$), neutropenia (18.7%), lymphocytosis (74.3 %; $16.5 \times 10^9/L$), monocytosis ($1 \times 10^9/L$) and trombocytopenia* have been noted.

Chronic lymphocytic leukemia is confirmed by peripheral blood smear.

The patient is not capable of work where can be exposed to ionizing radiation or other chematotoxic agents.

4. Discussion

Chronic lymphocyte leucaemia is a chronic malignant lymphoproliferative disease. Monoclonic proliferation and accumulation of lymphocytes in bone marrow, blood, lymph nodes, spleen, liver and other organs exist. Disease of B lymphocytes is more often. It is mostly among persons above 50 years of age, rare under 30 years of age. Etiology of illness is based on possible influence of chromosomal aberrations, oncogenes and retroviruses. Heredity is also very important. Oncogenes can be chemical and physic agenses (f.e. ionizing radiation) (1,2). If person with CLL is younger, we can think about another kind of the ethylogy, for example influence of work place and environment. Our patient is 42 years old and works as an meteorological technician in anti-hail operations. Work assesment in the workplace declared this workplace with low risk for occupational disorder pathogenesis. The worker is exposed to very low doses non-ionizing radiation, without risk to health. But we didn't have all data about antenna, about patient's received dose and duration of exposition. We consider that source of radiation (antenna) has about 5 GHz. But, worker is exposed if antenna is turn on and if he is on pathway of non-ionizing radiation wave. Also, we have been surprised by the information that eight colleagues had different forms of cancer.

So, generally, we need details from adequate Risk assesment of workplace because recognition of occupational disease requests clear correlation between workplace hazards and existing disease. NIOSH (National Institute of Environmental Health Sciences) and NIH (National Institutes of Health) researches non-ionizing radiation, and IARC (International Agency for Research on Cancer) classified non-ionizing radiation as 2B group: The agent (mixture) is possibly carcinogenic to humans. The exposure circumstance entails exposures that are possibly carcinogenic to humans. (2,3,4,5,6). So, low possibility for pathogenesis of chronic lymphocyte leucaemia exists. The non-ionizing radiation is not enough powerfull for ionization cells and carcinogenesis (2,3,4). According to the reliable data there is no correlation between non-ionizing radiation and chronic lymphocyte leucaemia.

5. Conclusion

Chronic lymphocyte leucaemia, in the most of cases, can not be correlated to exposition to non-ionizing radiation-radiofrequency radiation. In this case report we couldn't declare chronic lymphocytic leukemia as an occupational disease.

*Reference laboratory (hematologic) values at Institute of Occupational Health of Serbia:

Leucocytes: $3.4-9.7 \times 10^9/L$

Neutrophiles %: 44.0-72.0

Lymphocytes %: 20.0-46.0

Monocytes %: 2.0-12.0

Eosinophils%: 0.0-7.0

Basophils %: 0.0-1.0

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