Magnetic Field of Power Frequency - the influence of low-level inductions on cell-mediated immunity in patients with head and neck carcinoma

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Aim:
As recent studies have shown, magnetic field of power frequency (50 Hz) with induction of 0.5 mT has a statistically significant influence on the ability of CD4 lymphocytes adherence gained from peripheral blood taken from patients with head and neck carcinoma. (chart 1). This study is aimed to compare the influences of different inductions of power frequency magnetic field with respect to their ability to increase the adherence of CD4 lymphocytes in patients with head and neck carcinoma.

Method:
CD4 lymphocytes are separated from peripheral blood of patients with head and neck carcinoma. After adding a special tumorous antigen the lymphocytes ability to adhere to a surface (green glass SIAL) is monitored as a sign of cell-mediated immunity (LAI assay). Hypothesis is based on the fact that healthy CD4 lymphocyte shows its ability to adhere to a surface whereas the unhealthy CD4 lymphocyte loses such ability. The test is repeated in a chamber under the influence of power frequency of 50 Hz with induction of 10 mT, 1 mT, 0.5 mT and 0.1 mT. The results are recorded with the help of non-adherence index (NAI), where:

\[ NAI = \left(\frac{M_s - M_n}{M_n}\right) \times 100 \]

\[ M_s \quad \text{... \% CD4 lymphocytes non-adhering in presence of a specific antigen} \]
\[ M_n \quad \text{... \% CD4 lymphocytes non-adhering in presence of a non-specific (viral) LDH antigen} \]

The outcomes under 1.6 are considered physiological, those over 1.6 pathological.

Results:
We were comparing the adherence ability of CD4 lymphocytes gained from blood of patients with head and neck carcinoma before launching the treatment and after their exposure to magnetic field. The number of tested samples and intensity of induction are given in table 1. The table shows that NAI values fall under the influence of magnetic field of power frequency in cases of all applied inductions - see chart 2. The gained results have proved that magnetic field has a statistically significantly increases the ability of adherence in unhealthy CD4 lymphocytes (NAI value falls) in all applied inductions, including a very low-level induction of 0.1mT. In case of 0.5mT induction, namely statistical level of importance worth 0.001 is in question. There is no statistically significant difference among the average NAI values measured in all groups without the influence of magnetic field. For values received by measuring in magnetic field a statistically significant difference has been proved among the NAI values in inductions of 0.1mT and 10mT (level of importance of 0.05), and inductions of 0.5mT and 10mT (level of importance worth 0.001).

Conclusion:
If we consider the lymphocytes adherence ability a sign of cell-mediated immunity, it is clear that magnetic field of power frequency has an influence on cell-mediated immunity in patients with head and neck carcinoma, namely statistically significantly in all tested inductions (including a minimum induction of 0.1mT). There is a mutually statistically significant difference in influencing the ability of adherence among tested CD4 lymphocytes (0.1mT against 10mT the level of importance worth 0.05), and among 0.5mT and 10mT the level of importance worth 0.001). This result would show that higher induction values of 10mT elevate the adherence ability in unhealthy CD4 lymphocytes more significantly than lower inductions of 0.5mT and 0.1mT. Therefore, in vitro induction shows more significant positive influence on cell-mediated immunity in ill people. It may be also said that even the induction value of 0.1mT is not a threshold value - in other words: also magnetic field of that low induction has the influence on the cell-mediated immunity of people.

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![Chart 1: NAI values depending on exposure to magnetic field of 0.5mT/50 Hz](image1)

![Chart 2: NAI values without the influence of magnetic field and after the magnetic field induction](image2)