

Serum and blood trace metal levels as prognostic marker of survival in laryngeal cancer

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Key words: laryngeal cancer, trace metals, prognosis

Introduction:

There is a lot of literature data showing that metals can affect the development of cancer, including laryngeal cancer. However, their blood / serum levels have not yet been evaluated as a prognostic marker in laryngeal cancer. The aim of the study is a prospective evaluation of the correlation between results of treatment of patients with laryngeal cancer and levels of metals in the blood and serum.

Material and methods:

Study groups: 1) 315 patients treated surgically in the period from July 2009 to February 2017 due to squamous cell carcinoma of the larynx, from whom blood was collected before the beginning of treatment in order to assess the levels of zinc, iron and copper in the serum.

2) 184 patients treated surgically in the period from January 2012 to February 2017 due to squamous cell laryngeal cancer, from whom blood was collected before the beginning of treatment to assess the levels of zinc, iron, copper, arsenic, cadmium, mercury and lead in the whole blood .

Clinical information on the age of onset, sex, clinical stage, radiation therapy, chemotherapy and pack-years was collected from all patients.

To determine the levels of the indicated metals, the technique of inductively coupled mass spectroscopy (ICP-MS) was used.

The results of the treatment were evaluated on the basis of the number of deaths that occurred during the prospective observation period.

The test groups were divided into three parallel subgroups (tertiles) depending on the levels of individual metals. The relationship between blood / serum metal levels and survival was analyzed statistically uni and multivariate, taking into account the influence of age, sex, clinical stage, chemotherapy, radiotherapy and pack-years.

Results:

1. Zinc level in the serum: statistically significant increased risk of death in patients with the lowest zinc levels (<581 µg /l) in comparison with patients with the highest levels (> 688 µg /l): OR-2.04; p-0.029; HR-2.02; p <0.01.
2. Zinc level in the blood: statistically significant increased risk of death in patients with the lowest zinc levels (<5712 µg /l) in comparison with patients with medium levels (5716-6515 µg /l): OR- 3.15; p-0.01; HR-2.58; p <0.01.
3. Cadmium level in the blood: statistically significant increased risk of death in patients with mean cadmium levels (0.84-1.3 µg /l) in comparison with patients with the lowest levels (<83 µg /l): OR-2, 81; p-0.039; HR-2.14; p-0.043.
4. There were no statistically significant differences between the patients' survival and the levels of copper and iron in the serum as well as copper, arsenic, lead and mercury in the blood.

Conclusions:

The levels of zinc below 580 µg /l in the serum and below 5700 µg /l in the blood and the level of cadmium above 0.80 µg /l in the blood are associated with an increased risk of death of a patient with laryngeal cancer in Poland. The implementation of chemoprevention modifying the levels of the above-mentioned metals might improve the results of treatment of laryngeal cancer.