

**CHARACTERISTICS OF IL-6 AND IL-10 LEVELS IN THE ORAL
FLUID OF PATIENTS WITH CERVICAL CANCER UNDERGOING
RADIATION THERAPY**

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Relevance of the study is determined by the following provisions:

Radiotherapy is an essential treatment modality for cervical cancer; however, its effects on inflammatory and immune responses remain an important area of clinical research. Cytokines play a crucial role in regulating inflammation, tissue repair, and immune homeostasis. Interleukin-6 (IL-6), a pro-inflammatory cytokine, and interleukin-10 (IL-10), an important immunoregulatory cytokine, are involved in maintaining the balance between inflammatory activation and its suppression.

Previous studies have demonstrated that cytokine concentrations in saliva may change during and after radiotherapy, suggesting the potential value of salivary biomarkers for monitoring treatment-associated biological responses [11, 12]. In addition, research on cervical cancer has shown that radiotherapy-related changes in systemic cytokine levels warrant further investigation [13].

Oral fluid is a readily accessible, non-invasive biological material that may provide additional information about local and systemic inflammatory processes. However, findings obtained in patients with head and neck malignancies cannot be directly extrapolated to patients with cervical cancer receiving pelvic radiotherapy. Therefore, investigating IL-6 and IL-10 levels in

the oral fluid of these patients may help clarify whether changes in cytokine profiles occur during treatment and whether they are associated with clinical or treatment-related parameters.

The relevance of this study lies in evaluating the characteristics of IL-6 and IL-10 levels in oral fluid during radiotherapy for cervical cancer, thereby contributing to a better understanding of cytokine-mediated responses and assessing the potential of these biomarkers for future clinical monitoring.

Materials and Methods

The oral cavity was examined in 90 patients.

In accordance with the aims and objectives of the study, all patients were divided into four groups, with a total of 90 participants:

- Group 1 consisted of 26 patients with oral mucositis after chemotherapy;
- Group 2 included 26 patients with oral mucositis after radiotherapy;
- Group 3 consisted of 23 patients with oral mucositis who had not received treatment;
- The control group included 15 healthy individuals.

Results and Discussion

Given that IL-6 is a marker of acute inflammatory conditions and/or malignant tumors, regulates the maturation of autoantibodies, and is used to assess severe pathological conditions, it becomes clear that detecting this cytokine in oral fluid has diagnostic and pathogenetic significance.

Studies have shown that the concentration of IL-6 in the oral fluid of healthy women was 8.85 ± 1.01 ng/mL, whereas in affected women (group 1, $n = 26$) this value increased to 31.92 ± 1.20 ng/mL. This increase was 1.16-fold, which was statistically significant ($P < 0.001$). It turned out that such a significant increase in the amount of this cytokine did not suppress the inflammatory process in the body; radiation therapy intensified this

inflammation, and the presence of a malignant tumor, such as cervical cancer, also played an important role in its intensification.

Similar studies were conducted with IL-10. This is an anti-inflammatory cytokine with an apyrogenic effect, characterized by the inhibition of cellular immune reactions and the stimulation of IgE synthesis. IL-10 is also notable for its ability to reduce the action of all inflammatory cytokines.

The study showed that the concentration of IL-10 in this biological fluid was significantly increased by 2.43 times in affected women (group 1, n=26) compared to healthy women — 53.07 ± 1.68 ng/mL versus 21.87 ± 1.84 ng/mL, respectively ($P < 0.001$). The paradoxical increase in the levels of pro-inflammatory and anti-inflammatory cytokines is a sign of the intensive development of the pathological process. As the pathological process progresses, the predominance of anti-inflammatory cytokines is likely to increase. In this case, the combination of a malignant neoplasm (cervical cancer) and the negative impact of radiation therapy on local immunity, similar to the above-described scenario, led to the acquisition of numerical data.

Conclusions

Thus, a study of the quantitative parameters of cytokines in the oral fluid of women diagnosed with cervical cancer who are receiving radiation therapy showed that the concentration of IL-6 in healthy women was statistically significantly higher by a factor of 1.16 compared to that in affected women ($P < 0.001$). It turned out that such a significant increase in the level of this cytokine did not suppress the inflammatory process in the body, and radiation therapy intensified this inflammation; moreover, the presence of a malignant tumor, such as cervical cancer, also played an important role in its intensification. The concentration of IL-10 in this biological fluid was significantly higher in women with the disease — 2.43 times higher than in healthy women ($P < 0.001$). The same increase in pro-inflammatory and anti-inflammatory cytokines is a sign of a strong progression of the



pathological process. It was found that there is an inverse relationship between the decrease in the level of local immune factors and the increase in the level of IL-6 during radiation therapy.

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