Lymphopenia after mediastinal irradiation in lung cancer

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Background The decrease in cell-mediated immunity after radiotherapy (RT) is known, but the immunosuppression by radiation has not been considered in the context of blood flow within RT field. This study was undertaken to retrospectively evaluate changes in white blood cell counts after different treatments and find the correlation between the immunosuppression and large blood volume and dynamic blood flow within RT field in lung cancer.

Methods Thirty-four patients with lung cancer were retrospectively evaluated; 10 patients had only radiotherapy (RT), 8 had chemotherapy (CT) and 16 had chemotherapy and radiotherapy (CT+RT). The complete blood cell (CBC) counts were checked weekly during RT and less frequently during CT and after RT. The mean follow-up period of the RT-including groups (RT, CT+RT group) and the RT-excluding group (CT group) was 6 months and 8 months, respectively.

Results Changes in total white blood cell counts were not significantly different among three groups. The patients who received thoracic RT with or without CT had much lower lymphocyte counts and lymphocyte % after RT. The difference between pre-treatment lymphocyte count and final lymphocyte count was significant (p = 0.044) between the RT-including groups and the RT-excluding group. In addition, the difference between pre-treatment lymphocyte % and final lymphocyte % was significant (p=0.037) between the RT-including groups and the RT-excluding group. Regional blood flow and blood volume was estimated according to the model proposed by Bae et al.(1998) and the radiation time was correlated with the chances of lymphocytes encountering radiation within RT fields. The previous studies showing evidence of lymphocyte apoptosis after low-dose irradiation and large blood volume and dynamic blood flow within RT fields correlated to the lymphopenia after mediastinal irradiation.

Conclusion Lymphopenia was more marked after treatment containing RT than after CT alone. Lymphopenia may be one cause of a compromised immune system after mediastinal irradiation in lung cancer. Sparing the heart and major blood vessels might therefore contribute to stabilize the immune status of these patients.