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## The risk for developing a second primary tumor in long surviving cancer patients

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**Introduction:** Survival rate in cancer patients has increased in recent years and it is still growing. In these patients, there is a significant risk for developing a second primary tumor because of risk factors like genetic background, unhealthy behaviors or side effects from the therapy of first cancer. The goal of this study was to evaluate the frequency of incidence of different cancer types diagnosed in readmitted long-term survivors. An additional goal was to assess the risk for developing a metachronous cancer in patients with long-term survival.

**Methodology:** From the patients admitted to the Oncology Institute, Cluj-Napoca, Romania, in 2014-2015, we selected only those patients who were first admitted to the same institute at least 5 years prior to 2014-2015. For these patients we evaluated the reasons of the first presentation, as well as those for the 2014-2015 readmission. Furthermore, we analyzed every case with metachronous tumor by considering the location of the first and second primary tumor.

**Results:** Between 2014 and 2015 a total of 5080 cancer patients were admitted to the Oncology Institute Cluj-Napoca, Romania. 110 (2.17%) of these patients were first admitted more than 5 years ago. 25 (22.7%) of these 110 patients had no signs of oncologic disease, 21 (19.1%) had a continuous disease progression, 20 (18.2%) had a relapse after a free disease period, and 44 (40%) had a second primary tumor. Median age in this group was 65, with a median survival of 12 years after the diagnosis of the first malignancy. The female to male ratio F : M was 1.3:1. In the men's subgroup, head and neck cancers were found in 11 patients (23% of the cases), lung cancer in 7 (14.6%), central nervous system cancer in 5 (10.4%), and each of colon and urinary bladder cancer in 3 (6.3%) patients. In the women's subgroup, breast cancer was diagnosed in 14 patients (23.3% of the cases), cervical cancer in 8 (13.3%), endometrial cancer in 7 (11.7%), ovarian cancer in 6 (10%), and each of head and neck and soft tissue cancer in 4 (6.7%) cases. In men with long-term survival (more than 5 years), 45% of those who were previously diagnosed with head and neck cancer developed in time a second primary cancer (5 of 11). Similar results for lung and prostate cancer patients were 28.5% (2 of 7) and 25% (2 of 8) respectively. None of the 5 cases of long term survivors of brain tumors developed second cancer. In the women's subgroup, 12 of 14 (85%) of the patients who had breast cancer were diagnosed with a second malignancy. The corresponding data for cervical cancer was 4 of 8 (50%), for endometrial cancer 3 of 7 (42.8%), and for ovarian cancer 1 of 6 (16.66%). When common primary cancer sites are compared for both sexes, head and neck cancer was found to be significantly more frequent in men (23% vs 6.7%,  $p=0.01$ ); for lung cancer it was (14.6% vs 3.3%,  $p=0.03$ ) and for urinary bladder cancer it was 6.3% vs 0%, with a  $p$  value of  $p=0.05$ .

**Conclusion:** 4 of 10 of the long-term survivors readmitted in the Oncology Institute were diagnosed with a second malignancy. In men, the most frequent first cancer was head and neck, and breast cancer was women's most frequent malignancy. A comparison of common cancer sites for both sexes show the following: head and neck, lung and urinary bladder cancers were more common in men. Almost half of the men surviving for more than 5 years after being diagnosed with a tumor on the head and neck were diagnosed with a second cancer. The same situation was found for almost a third of the men who were previously diagnosed with lung cancer and a quarter of those who were previously diagnosed with prostate cancer. In women, the reason for readmission for 85% of the patients with breast cancer diagnosis more than 5 years ago was the occurrence of a second primary tumor. Cervical cancer and endometrial cancer also represented an increased risk (around 50%) of developing a new primary cancer.

**Country**

Romania

**Institution**

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