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▶ [Association Between SV40 and Non-Hodgkin ...](#)



[Leukemia & Lymphoma](#) >

Volume 44, 2003 - Issue sup3

56 | 6

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Association Between SV40 and Non-Hodgkin's Lymphoma

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Abstract

Millions of people worldwide were inadvertently exposed to live simian virus 40 (SV40) between 1955 and 1963 through immunization with SV40-contaminated polio vaccines. Although the prevalence of SV40 infections in humans is not known, numerous studies suggest that SV40 is a pathogen resident in the human population today. SV40 is a potent DNA tumor virus that is known to induce primary brain cancers, bone cancers, mesotheliomas, and lymphomas in laboratory animals. SV40 oncogenesis is mediated by the viral large tumor antigen (T-ag), which inactivates the tumor suppressor proteins p53 and pRb. During the last decade, independent studies using different molecular biology techniques have shown the presence of SV40 DNA, T-ag, or other viral markers in primary human brain and bone cancers and malignant

eg, or other immunoregulatory primary human breast and bone cancer and malignant mesotheliomas. Evidence suggests that there may be geographic differences in the frequency of these virus-positive tumors. Recent large independent controlled studies have shown that SV40 T-ag DNA is significantly associated with human non-Hodgkin's lymphoma (NHL). In our study, we analyzed systemic NHL from 76 HIV-1-positive and 78 HIV-1-negative patients, and nonmalignant lymphoid samples from 79 HIV-1-positive and 107 HIV-1-negative patients without tumors; 54 colon and breast carcinoma samples served as cancer controls. We used polymerase chain reaction (PCR) followed by Southern blot hybridization and DNA sequence analysis to detect DNAs of polyomaviruses and herpesviruses. SV40-specific DNA sequences were detected in 64 (42%) of 154 NHL, none of 186 nonmalignant lymphoid samples, and none of 54 control cancers. For NHL from HIV-1-positive patients, 33% contained SV40 DNA and 39% Epstein-Barr virus (EBV) DNA, whereas NHLs from HIV-1-negative patients were 50% positive for SV40 and 15% positive for EBV. Few tumors were positive for both SV40 and EBV. Human herpesvirus type 8 was not detected. SV40 sequences were found most frequently in diffuse large B cell and follicular-type lymphomas. We conclude that SV40 is significantly associated with some types of NHL and that lymphomas should be added to the types of human cancers associated with SV40.

Hematology Non-Hodgkin's lymphoma Polyomavirus SV40 Viral infection

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