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Relationship between the brain radiation dose for the treatment of childhood cancer and the risk of long-term cerebrovascular mortality.

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Abstract

To date, very little is known about the long-term risk of death from cerebrovascular sequelae following childhood cancer treatment. The purpose of this study was to assess the role of treatment in very long-term cerebrovascular mortality following childhood cancer. We studied 4227 5-year survivors of a childhood cancer. Information on chemotherapy was collected and the radiation dose delivered to 11 anatomical sites in the brain was estimated. The main outcome that was considered was death due to cerebrovascular disease occurring before 1 January 2008. After a median follow-up of 29 years, 23 deaths due to cerebrovascular diseases had occurred. In the brain, the radiation dose delivered to the preoptine cistern seemed to play a greater role than the average radiation dose received throughout the brain or the dose to any other specific anatomical site in the brain. The risk of death from cerebrovascular disease increased linearly with the local radiation dose to the preoptine cistern. Each unit of absorbed radiation (Gray) delivered to this area increased the risk by 22% (95% confidence interval: 1-44%). Compared with patients who had not received radiotherapy or who had received <0.1 Gray in the preoptine cistern area, those who had received >50 Gray had a 17.8-fold (4.4-73.0) higher hazard ratio of death from cerebrovascular disease. In conclusion, among 5-year survivors of childhood cancer, the radiation dose to the brain during radiotherapy was significantly associated with long-term cerebrovascular mortality.

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