


## Journal Article



## Childhood central nervous system leukemia: historical perspectives, current therapy, and acute neurological sequelae

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### Abstract

**Introduction** During the past three decades, improvements in the treatment of childhood leukemia have resulted in high cure rates, particularly for acute lymphoblastic leukemia (ALL). Unfortunately, successful therapy has come with a price, as significant morbidity can result from neurological affects which harm the brain and spinal cord. The expectation and hope is that chemotherapy, as a primary means of CNS therapy, will result in acceptable disease control with less CNS morbidity than has been observed with combinations of chemotherapy and radiotherapy over the past several decades.

**Methods and results** In this review we discuss the poignant, historical aspects of CNS leukemia therapy, outline current methods of systemic and CNS leukemia therapy, and present imaging findings we have encountered in childhood leukemia patients with a variety of acute neurological conditions. A major objective of our research is to understand the neuroimaging correlates of acute and chronic effects of cancer and therapy. Specific features related to CNS leukemia and associated short-term toxicities, both disease- and therapy-related, are emphasized in this review with the specific neuroimaging findings. Specific CNS findings are similarly important when treating acute myelogenous leukemia (AML), and details of leukemic involvement and toxicities are also presented in this entity.

*Conclusion* Despite contemporary treatment approaches which favor the use of chemotherapy (including intrathecal therapy) over radiotherapy in the treatment of CNS leukemia, children still occasionally experience morbid neurotoxicity. Standard neuroimaging is sufficient to identify a variety of neurotoxic sequelae in children, and often suggest specific etiologies. Specific neuroimaging findings frequently indicate a need to alter antileukemia therapy. It is important to appreciate that intrathecal and high doses of systemic chemotherapy are not innocuous and are associated with acute, specific, recognizable, and often serious neurological consequences.

**Keywords** Childhood CNS leukemia - Neurotoxicity - Intrathecal therapy - CNS infection - Secondary malignancies - Methotrexate

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