

Central nervous system prophylactic treatment for childhood leukemia: neuropsychological outcome studies

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The average life expectancy in 1950 of a child diagnosed as having acute leukemia was approximately 3 months (4). With the advent of systemic chemotherapy employing such agents as prednisone and vincristine, the remission rate jumped from less than 5% to approximately 90% with most of these children being initially completely free of symptoms and other apparent signs of disease (30, 47). Unfortunately, a substantial number of the children sustained a central nervous system (CNS) and hematological relapse at various times after their remission. These relapses usually involved the infiltration of leukemic cells into the meninges and cerebral spinal fluid (CSF) before remission was achieved, suggesting that systemic chemotherapy agents were not adequately penetrating the 'blood-brain barrier' and affecting the leukemic cells that had entered the CNS, but were not causing measurable neurological impairment (49). This situation led to the current use of 'prophylactic' CNS treatment for acute leukemia of childhood. The purpose of the prophylactic treatment of CNS is to eradicate microscopic foci of leukemic cells within the subarachnoid space before they can proliferate and cause a full hematological or CNS relapse (55).

Prophylactic treatment most often includes cranial irradiation or intrathecal methotrexate singly or in some combination (1). The most common radiation doses are 1800 or 2400 rads spread over a 10–14 day period and intrathecal methotrexate is usually administered in six doses of 12 mg/m² over a 1–2 month period. Some treatments also include radiation to the spine. The use of a comprehensive treatment that includes such prophylaxis has helped to increase the 5-year survival rate from essentially 0% to approximately 50%, and the risk of relapse after 5 years is relatively small (56).

Although prophylactic treatment represents a major breakthrough, it is not without disadvantages. Cranial irradiation and intrathecal methotrexate are both known to cause

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