

Abstract submitted for presentation to the 6th International Congress of the International Association for the Scientific Study of Mental Deficiency, August 22-26, 1982, Toronto, Canada.

CSF CCK, VIP and Substance P in Mental Retardation Syndromes and in Children Undergoing Cranial Irradiation and Intrathecal Chemotherapy

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Cholecystokinin (CCK) and vasoactive intestinal polypeptide (VIP) are peptides that have high concentrations in the human cerebral cortex and possibly function as neurotransmitters. In order to investigate the possibility that abnormalities of these peptides may play a role in mental retardation syndromes, the concentration of CCK, VIP and substance P (SP) were measured by radioimmunoassay in the CSF of 6 children with mental retardation (two with cerebral gigantism, and one each with Down's syndrome, Noonan's syndrome, dementia of uncertain etiology, and dementia with basal ganglia degeneration). To establish norms and to investigate the possibility that alterations in the concentration of these peptides may be a nonspecific finding, they were assayed in 126 CSF samples from 41 children undergoing cranial irradiation and intrathecal chemotherapy. 112 repeated determinations were performed on 28 children. 25 were being treated for acute lymphocytic leukemia, and one each for acute nonlymphocytic leukemia, lymphoma and rhabdomyosarcoma. Lumbar CSF was obtained at times of diagnostic and chemotherapeutic lumbar puncture according to protocols approved by the Human Studies Committee and frozen until assayed. Serial dilutions of CSF produced ligand displacement curves which were parallel to those obtained with the respective antisera for VIP<sub>1-28</sub>, SP<sub>1-11</sub> and CCK<sub>1-8</sub>.

Findings included: (1) no significant difference in the peptides of the children with mental retardation, (2) no significant change in the peptides in 6 children undergoing cranial irradiation (1800 to 2160 rads), (3) no consistent changes in the peptides during leukemic infiltration of the CNS in 4 patients, (4) no significant effect on the peptides in 7 individuals from initiation of intrathecal chemotherapy to subsequent intervals of 21 to 128 days and a suggestion of a decline in CCK and SP in 5 children over intervals of 188 to 342 days.