Biogenic amines

The biogenic amines (dopamine, epinephrine, norepinephrine, and serotonin) are involved in the regulation of multiple neuronal functions, and changes in monoamine concentrations in the CSF have been detected in several disorders.

The role of biogenic amines in the ventricular CSF of children suffering from posterior fossa tumors and their possible correlation with tumor histology and cognitive functioning.

Twenty-two children with posterior fossa tumors who were treated surgically at Children's Hospital “Agia Sofia” were studied. Patients ranged in age from 5.5 to 15 years. The study population included patients who suffered from hydrocephalus and were treated by ventriculoperitoneal shunt placement. During the operation for shunt placement, a CSF sample was obtained for the assessment of 3-methoxy-4-hydroxyphenylglycol (MHPG), homovanillic acid (HVA), and 5-hydroxyindoleacetic acid (5-HIAA). Simultaneously, a blood sample was also obtained for assessment of the same metabolites in the serum. The concentration of vanillylmandelic acid (VMA) was evaluated in 24-hour urine samples in 11 patients. Cerebrospinal fluid from a control group of children was also studied. Executive functions were assessed using the short form of the Wechsler Intelligence Scale for Children (WISC).

Twelve patients suffered from astrocytomas, 9 from medulloblastomas, and 1 from an ependymoma. The MHPG concentration in CSF was significantly higher in patients with astrocytomas compared with patients with medulloblastomas. Twenty-four-hour urine samples of VMA were significantly higher in patients with astrocytomas compared with patients with medulloblastomas. The MHPG concentration in CSF was negatively correlated with the verbal scale of the WISC and there was a trend toward a significant negative correlation with the total WISC score. Homovanillic acid in CSF was positively correlated with the performance scale of the WISC. There was a significant correlation between HVA and MHPG levels in CSF. The CSF concentration of 5-HIAA was significantly correlated with the HVA concentration in serum. Twenty-four-hour urine VMA samples were statistically significantly correlated with HVA concentration in both CSF and serum, with MHPG in CSF, and with 5-HIAA in serum.

This study showed that children with posterior fossa tumors have differences in the levels of monoamine metabolites in CSF. Further studies with a larger number of patients are obviously needed to verify these observations as well as studies to correlate the monoamine metabolite levels with the neuropsychological and behavioral findings in children with posterior fossa tumors [1)].

1)
Varela M, Alexiou GA, Liakopoulou M, Papakonstantinou E, Pitsouni D, Alevizopoulos GA. Monoamine metabolites in ventricular CSF of children with posterior fossa tumors: correlation with tumor histology and cognitive functioning. J Neurosurg Pediatr. 2014 Feb 21. [Epub ahead of print] PubMed PMID: 24559277.