Determination of Urine Neuron-Specific Enolase Levels in Neuroblastoma Patients

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GOTOH, Y-I., HASHIMOTO, K., INOUE, S., SUZUKI, J. and TADA, K. Determination of Urine Neuron-Specific Enolase Levels in Neuroblastoma Patients. Tohoku J. exp. Med., 1985, 147 (4), 429-430 — Urine levels of neuron-specific enolase were determined in 3 neuroblastoma patients (1 in an advanced state and 2 in remission), 25 control children, 37 control adults and 4 children with hematuria by means of the double-antibody inhibition radioimmunoassay specific to the γ subunit of enolase isozymes. The levels of neuron-specific enolase mean ± s.d. ng/creatinine (Cr) mg in an advanced neuroblastoma patient were elevated (1.25±0.29 before or after treatment and range 1.61-74.2 during treatment) when compared with those of control subjects (0.51±0.26 in children and 0.36±0.17 in adults). The levels in 2 neuroblastoma patients in remission were within normal range. Urine samples with hematuria were not used for the assay. — neuroblastoma; urine; neuron-specific enolase

Neuron-specific enolase (NSE), primarily found in tissue of the central nervous system, has been shown to be contained in the neuroendocrine cells and neuroendocrine tumors (Tapia et al. 1981). It has been reported that serum NSE level was closely related to the clinical response to the therapies of these patients (Ishiguro et al. 1983). In this report, we describe the results of urine NSE (ng/creatinine (Cr) mg) assays in healthy children, healthy adults and two neuroblastoma patients in remission, and those of serial measurements of urine NSE (ng/Cr mg) levels in an advanced neuroblastoma patient by the double-antibody radioimmunoassay (RIA) method.

Control samples consisted of urines from 25 children and 37 adults. The patient 1, 2 and 3 were a 2 year-7 month old male with neuroblastoma, a 1 month old female with neuroblastoma and a 1 year-4 month old male with ganglio-neuroblastoma, respectively. Initial levels of serum NSE (ng/ml) in patient 1, 2 and 3 were 128.0, 51.0 and 35.5, respectively. In patient 1, serum NSE levels fell temporarily to nearly normal levels as the patients responded to chemotherapy and radiation but the serum NSE levels increased again as his condition deteriorated. Then collections of urine for measurements of NSE started. In patient 2 and 3, high serum NSE levels returned to normal levels after intensive treatments. During the remission period, urine samplings were done. The samples were collected as soon as possible after the passage of urine, added with 50% glycerol in the final 10% glycerol concentration, and then stored at −4°C until assayed. All of the samples were processed within 1 week. The urine samples were analyzed for the levels of NSE and Cr by a RIA method (NSE kit, Eiken Immunochemical Laboratory, 429
Tokyo, Japan) and a spectrophotometric method (Creatinine-Test Wako, Wako Pure Chemicals Ltd., Tokyo), respectively.

The mean levels of urine NSE (ng/Cr mg) are shown in Fig. 1: 0.51±0.26 (s.d.) in control children, 0.36±0.17 (s.d.) in control adults, 1.62±0.40 (s.d.) in children with hematuria. Serial measurements were performed in patient 1 during the course of chemotherapy. In patient 1, urine NSE (ng/Cr mg) level was 2.83 before treatment. During the treatment, urine NSE (ng/Cr mg) levels raised to more than 3.0 and then decreased to 1.79-2.53 within 5-6 days. Finally, the urine NSE level in patient 1 was 1.25±0.29 (s.d.) (serum NSE : 10-20 ng/ml). In patient 2 and 3, in remission, urine NSE (ng/Cr mg) levels were within normal range.

The purpose of this study was to provide a practicable method of urine NSE measurement. Thus we have used ratios of NSE/Cr concentration. This is because the daily urine volume in children is notoriously variable. Equally, the practical difficulties of 24 hr urine collections in children are well known. Urine samples with hematuria were not used in the assay for urine NSE, because human red blood cells contain appreciable amounts of NSE (Kato et al. 1983).

The correlation between urine NSE (ng/Cr mg) levels and clinical features should be analyzed in details in future, although the present study demonstrates that the ratio of urine NSE/Cr is higher in an advanced neuroblastoma patient than in controls.

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References

