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Note

Myo-inositol levels in the cerebrospinal fluid of infants

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While developing multicomponent gas chromatographic methodology (metabolic profiling) for organic constituents of human cerebrospinal fluid (CSF) [1,2], we had an opportunity to analyze CSF samples of five infants with various suspected disorders. We found these samples to be very "dilute", except for the exceptionally high levels of myo-inositol and small amounts of glucose in the polyol profiles [1]. A comparison of infant samples with those of "normal" adults is given in Table I, whereas Fig. 1 compares typical profiles of an adult with an infant.

The "normal" values were recorded for adult patients who had disk injuries or arthritic conditions, but suffered from no known complicated illnesses. Because lumbar puncture is a procedure ethically and sometimes legally limited to clinically justified cases, no strictly normal values were available for infants.

The determinations of polyol profiles were performed using the previously described method [1] that consists of protein removal, sample derivatization and gas chromatography of the trimethylsilylated polyols, with use of glass capillary columns. Identity of chromatographic peaks was ascertained from mass spectra and retention of standards.

While myo-inositol levels can be either decreased or increased in certain clinically important cases such as bacterial meningitis, senile dementia [3], diabetic conditions, possibly heart disease and hypertension [3,4], chronic

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arachnoiditis and brain tumor [1], etc., such departures from the normal are considerably less substantial than the infant values reported here.

The metabolic importance of inositol is well established, while its lack could result in cerebral dysfunction. Myo-inositol is synthesized in the brain

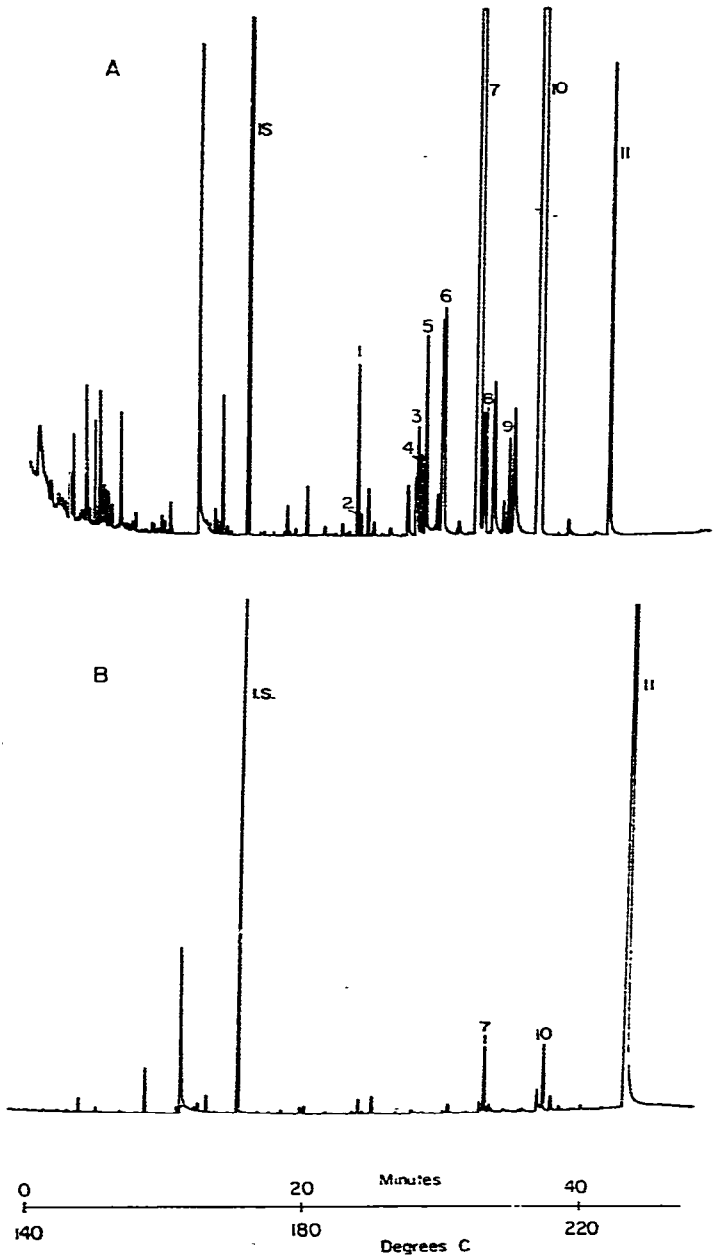

Fig. 1. Chromatograms of polyols in CSF. Conditions: 50 m × 0.25 mm I.D. glass capillary column, temperature programmed from 140—240°C at 2°C/min; flame ionization detector. (A) "Normal" adult sample; (B) infant sample. Peaks: I.S. = dodecanol (internal standard); 1 = arabinitol; 2 = ribitol; 3, 5 = fructose; 4, 8 = mannose; 6 = 1,5-anhydroglucitol; 7, 10 = glucose; 9 = glucitol (sorbitol); 11 = myo-inositol.

TABLE I

CONCENTRATION OF POLAR NEUTRAL COMPOUNDS IN THE CSF OF "NORMAL" ADULT PATIENTS AND INFANT PATIENTS

mg/l ± standard deviations, based on six normal and five infant samples.

Compound	"Normal" adult (mg/l)	Infant (mg/l)
Ribitol	3.4 ± 2.0	–
Fructose	7.6 ± 3.6	–
Mannose	8.5 ± 5.5	–
1,5-Anhydroglucitol	37.1 ± 16.5	–
Glucose	789 ± 275	9.8 ± 14.4
Glucitol	4.8 ± 3.0	–
Inositol	54 ± 12	612 ± 288

from glucose phosphate and incorporated into membrane lipid structures. Thus, the "overproduction" of this substance in the central nervous system of infants is not surprising in view of the intensive biosynthesis of new brain structures.

Finding high myo-inositol levels in this work is also consistent with the published chromatogram of Horning and Horning [5] and high urinary level of the same substance in a newborn.

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