Cerebrospinal Fluid Indoleacetic Acid in Autistic Subjects

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Cerebrospinal fluid (CSF) levels of the tryptamine metabolite, indoleacetic acid (IAA), have been measured in groups of autistic and control subjects. No significant difference was seen in group mean (± SEM) levels of CSF IAA (autistics 5.53 ± 0.47 ng/ml, N = 10). The finding indicates that central metabolism of the behaviorally active trace amine tryptamine is probably normal in autism.

INTRODUCTION

Tryptamine is a behaviorally active trace amine formed by decarboxylation of tryptophan by the enzyme, aromatic amino acid decarboxylase (AAAD). Tryptamine's nonhomogenous distribution in brain (Phillips, Durdan, & Boulton 1974), its influence on neuronal firing rates (Boulton & Jones, 1980), and an apparent subcellular compartmentalization (Boulton & Baker, 1975) support the hypothesis that tryptamine is a central neuromodulator (Jones, 1982; Young, 1983).

The central metabolism of tryptamine is of particular interest in autism for several reasons. Tryptamine and its major metabolite, indoleacetic

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acid (IAA), are found in highest concentrations in the striatum (Phillips et al., 1974; Warsh, Chan, Godse, Coscina, & Stancer, 1977), an area that might be involved in the etiology of the stereotypic behavior often seen in autistic subjects. The robust and well-replicated finding of elevated blood 5-hydroxytryptamine (serotonin, 5-HT) in autism also suggests the study of tryptamine. Although no direct connection has been demonstrated between the peripheral finding and central 5-HT functioning, it has stimulated research on brain 5-HT in autism (Anderson & Hoshino, 1987; Young, Kavanagh, Anderson, & Cohen, 1982; Yuwiler, Geller, & Ritvo, 1985). Tryptamine and 5-HT are closely related indoleamines, and tryptamine has been reported to affect serotonergic neurons (Boulton & Jones, 1980).

In order to assess central tryptamine metabolism in autism we have measured CSF levels of IAA in autistic and normal subjects. It has been previously established that CSF IAA arises from the monoamine oxidase (MAO) catalyzed oxidation of brain tryptamine and that its measurement provides a good index of the central metabolism of tryptamine (Young, Anderson, Gauthier, & Purdy, 1980).

### METHODS

Lumbar CSF was obtained from eight unmedicated autistic subjects (DSM-III criteria, 299.00) as part of a study of the behavioral and neurochemical effects of fenfluramine. CSF samples were also obtained from selected patients ("childhood controls") undergoing diagnostic myelography. An attempt was made to age- and sex-match control and autistic subjects (see Table I for demographic data). CSF was frozen at −70 °C immediately after collection. Samples were analyzed for IAA using high performance liquid chromatography (HPLC) with fluorometric detection (Anderson & Purdy, 1979).

### RESULTS AND DISCUSSION

Group mean levels of CSF IAA in the autistic and control groups are given in Table I. No significant difference (Student's t test, $p = .47$) was seen between the autistic and childhood control groups. The group mean observed in this young control group (6.29 ng/ml) was slightly higher than previously reported for adult controls (Anderson, Gerner, Cohen & Fairbanks, 1984) and lower than that reported for neonatal subjects (Anderson, Hoder, Shaywitz, & Cohen, 1985). Although comparison of the group means (which should be comparable given the use of single, quality-assessed method for