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# Self-rated childhood emotional neglect and CSF monoamine indices in abstinent cocaine-abusing adults: possible implications for suicidal behavior

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## Abstract

Non-human primate studies suggest that early environmental influences may have an enduring effect on central serotonin function. Therefore, it was decided to examine in humans whether childhood trauma might be related to cerebrospinal fluid (CSF) concentrations of the serotonin metabolite 5-hydroxyindoleacetic acid (5-HIAA) as an adult. A total of 29 withdrawn cocaine-dependent patients completed the Childhood Trauma Questionnaire. They also had a lumbar puncture for determination of CSF concentrations of 5-HIAA. CSF concentrations of the dopamine metabolite homovanillic acid (HVA) were also determined. Childhood emotional neglect scores showed significant negative correlations with CSF levels of 5-HIAA and HVA, and patients with emotional neglect scores above the median had significantly lower CSF 5-HIAA and HVA levels than patients with emotional neglect scores at or below the median. These findings suggest the possibility that childhood trauma may have an effect on central monoamine function as an adult.

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## 1. Introduction

Serotonin is a neurotransmitter implicated in impaired impulse control, aggression and suicidal behavior. Low cerebrospinal fluid (CSF) concentrations of the serotonin metabolite 5-hydroxyindoleacetic acid (5-HIAA) have been found in

suicide attempters, as well as in patients with impulsive–aggressive personality disorders (Brown et al., 1979, 1982; Kruesi et al., 1990, 1992; Mann and Malone, 1997; Stanley et al., 2000; Placidi et al., 2001). CSF 5-HIAA concentrations have both genetic and environmental determinants (Oxenstierna et al., 1986; Higley et al., 1993; Kraemer et al., 1997; Jönsson et al., 2000). Higley et al. (1996a,b) developed an animal model

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to investigate early environmental influences on central serotonin. They examined CSF 5-HIAA in a 4-year longitudinal study of rhesus macaque monkeys, half of which were reared with their mothers, while the other half were separated from their mothers and peer-raised. They found that the monkeys permanently separated from their mothers as infants had significantly lower CSF 5-HIAA levels than their non-separated peers. Furthermore, the low CSF 5-HIAA of such separated monkeys persisted stably over time in a trait-like manner and was associated with impulsive-aggressive behavior (Higley et al., 1996c,d; Higley and Linnoila, 1997). They concluded that early traumatic experiences might have an effect on central serotonin. A competing view is that the neurobiologic abnormalities may be correlates of traits that contribute to certain individuals being abused or neglected.

It was therefore decided to examine whether childhood trauma was similarly associated with low CSF 5-HIAA as an adult. Thus, a childhood trauma questionnaire was administered to withdrawn cocaine-dependent adults who, as part of their participation in biological studies, had a lumbar puncture for determination of CSF 5-HIAA. It was hypothesized that there would be a significant negative relationship between a history of childhood trauma and CSF 5-HIAA as an adult.

## 2. Methods

The study group comprised 29 withdrawn cocaine-dependent patients who were admitted to the locked ward of the Substance Abuse Treatment Program at the Department of Veterans Affairs (DVA), New Jersey Healthcare System, East Orange Campus. Patients were screened with the Structured Clinical Interview for DSM-IV (SCID; First et al., 1997) by a psychiatrist (AR) and were only enrolled in the study if they met DSM-IV criteria for cocaine dependence (American Psychiatric Association, 1994), identified cocaine as their illicit drug of first choice, and did not meet criteria for another lifetime Axis I major psychiatric disorder. Patients with a medical disorder or who were taking any medication that could affect brain function were also excluded. After complete

description of the study, written informed consent was obtained.

Patients completed the 34-item version of the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994), which yields scores for emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect. The CTQ has been shown to have high reliability and validity (Bernstein et al., 1994, 1997). Patients were then placed on a low-monoamine diet. When patients were at least 8 days free of illicit drugs, a lumbar puncture was performed with the patient fasting and in the lateral decubitus position. The first 10 ml of CSF was collected as a pool, mixed and aliquotted into tubes, and stored in a refrigerator at  $-80^{\circ}\text{C}$  until assayed. CSF was assayed for 5-HIAA and the dopamine metabolite homovanillic acid (HVA), using high-performance liquid chromatography (HPLC) with electrochemical detection.

In the statistical analysis, Pearson's method of correlation was first used to examine whether there was a negative relationship between CSF 5-HIAA and childhood trauma scores. As a significant

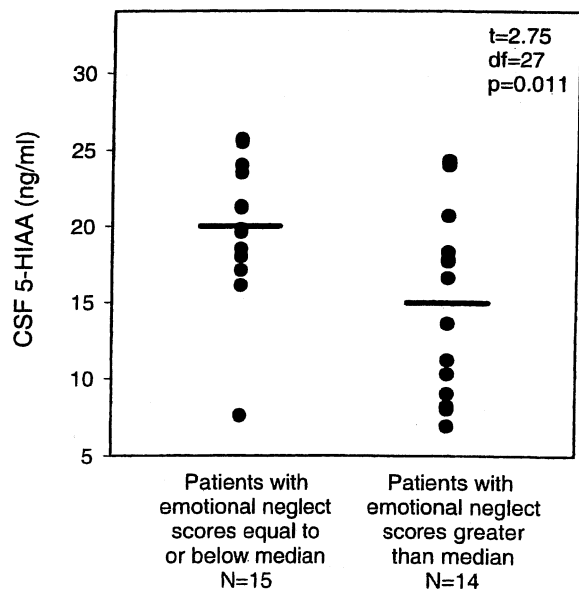


Fig. 1. Patients with childhood emotional neglect scores above the median had significantly lower CSF 5-HIAA than patients with childhood emotional neglect scores at or below the median.

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