An Experimental Evaluation of Targeted Amino Acid Therapy with At-Risk Children

Karyn Purvis, Ph.D., Gottfried Kellermann, Ph.D., David Cross, Ph.D., Mieke Kellermann, Ph.D., Han Huisman Ph.D., & Jacquelyn Pennings, M.S.

Abstract

In this preliminary investigation we explored the efficacy of Targeted Amino Acid Therapy (TAAT) with adopted children at risk for serious behavior disorders. We recruited a sample of 78 children from local support groups, and randomly assigned them to either a treatment group (TG), or to a delayed-treatment control group (CG). The treatment consisted of amino acid supplements designed to provide nutritional support for serotonin and GABA production. Data were collected once in mid-July and once in mid-September. Children provided a morning urine sample, and parents completed Achenbach's Child Behavior Checklist (CBCL) at both time points. Urine samples were assayed for eight neurotransmitters (NT): epinephrine, norepinephrine, dopamine, serotonin, GABA, glutamate, PEA, and histamine. Data were analyzed using repeated measures MANOVA and ANOVA. The treatment group showed significant improvements on four of eight NT assays – epinephrine, serotonin, GABA, and PEA – and on six of eleven CBCL subscales – Anxiety/Depression, Thought Problems, Attention Problems, Aggressive Behavior, Other Problems and Externalizing Behaviors. These improvements, resulting from a brief two-month intervention, suggest that TAAT has promise as an intervention for behaviorally disordered children.

Introduction

Many families who adopt children with special social-emotional needs (e.g., disturbances of attachment, emotional disregulation) have great difficulty finding effective professional intervention. Behavioral approaches can be effective, but are relatively scarce. Families almost inevitably gravitate towards pharmaceutical interventions, because there may be no other alternative available to them. However, drugs have limited efficacy with this population of children, and in some instances are contraindicated. In the research reported here we investigate the efficacy of a third alternative to behavioral and pharmaceutical approaches, which is nutritional supplementation using Targeted Amino Acid Therapy (TAAT). Based upon an evaluation of the child's current neurotransmitter levels, TAAT can be used to provide nutritional support for the production of neurotransmitters (NT) that are deficient in the child's CNS. We hypothesized that by enhancing the production of deficient NT, TAAT can lead to changes both in children's NT levels and in their behavior.

Participants and Procedures

Fifty-seven families, with a total of 97 children, were recruited through local support groups for adoptive parents. Approximately half of the children (48) had received one or more clinical diagnoses. Families were randomly assigned to either a treatment group (TG) or to a delayed-treatment control group (CG). Seventy-eight children had complete data, with noncompletion rates being approximately equal across the two treatment groups. There were 44 children (14 girls, 30 boys, average age = 10.0 yrs) in the TG, and 34 children (14 girls, 20 boys, average age = 9.7 yrs) in the CG.

Parents attended an informational meeting, where they were informed about study procedures and TAAT. Pre-testing was done in mid-July, and post-testing was done in mid-September. At both testing times children provided a urine sample, and parents completed Achenbach's Child Behavior Checklist (CBCL). Based on the pretest NT profiles, it was decided to focus TAAT on two NT: GABA and serotonin. As a group, the children had depressed levels of inhibitory NT (serotonin, GABA), and elevated levels of excitatory NT (glutamate, PEA). Children received TAAT support for approximately 6-8 weeks before post-testing.

Measures

Families were supplied with one urine sample kit for each child participating in the study. Parents were instructed to obtain the second urine sample of the morning, and then ship this to our laboratory in the supplied packaging. Each sample was assayed for epinephrine, norepinephrine, dopamine, serotonin, GABA, glutamate, PEA, and histamine, with quantities being expressed in parts per gram of creatinine. In general, the children in this sample tended to have very low levels of serotonin, either high or low levels of dopamine, and high levels of the remaining NT.

The CBCL is a widely used problem checklist for children and adolescents. It consists of 113 items (e.g., "Threatens people", "Shy or timid", "Bites fingernails"), which parents rate on a 3-point scale: 0 = "Not true (as far as you know)", 1 = "Somewhat or sometimes true", 2 = "Very often or often true". The CBCL yields nine subscales and two composite scales:

• Internalizing: Withdrawn, Somatic Complaints, Anxious/Depressed
• Externalizing: Aggressive Behavior, Delinquent Behavior
• Social Problems, Thought Problems, Attention Problems, Other Problems

Results

Data were analyzed with MANOVA to determine if there was an overall effect of the treatment on the children's NT profiles and CBCL profiles. The group x measure x time interaction was significant ($p < .05$) for both the NT and CBCL profiles, indicating different patterns of change for the two groups across measures. Univariate ANOVAs revealed significant ($p < .05$) group x time interactions for four of the NT (see "Changes in NT Levels" below), and for six of the CBCL subscales (see "Changes in Behavior Problems" below). The charts show percent change in each measure with significant group differences in the amount of change, and are highlighted if the percent change was 10 or greater. The highlighting is green if the change is a positive outcome, and red if a negative outcome. All of the ANOVAs were conducted with gender as a factor, and age as a covariate, in order to control for possible gender and age effects.

Results and Discussion

In addition to the analyses of group differences shown above, regression analyses were also done to determine which NT predicted the children's behavior problems as reported by their parents. Three NT – norepinephrine, dopamine, and PEA – were in general the best predictors of behavior problems, with PEA being the strongest predictor of the behaviors that changed (most especially, Anxiety/Depression, Thought Problems, and Attention Problems).

Taken together, these results imply that TAAT impacted serotonin and GABA levels directly, and indirectly impacted epinephrine and PEA levels. In turn, reductions in PEA levels may have played a pivotal role in the reduction of some problem behaviors. Although more research is needed, especially studies that control for placebo effects, this initial study suggests that TAAT is a promising avenue of research and development.

Changes in NT Levels

Morning Urine Levels of:	Percent Change	
	Experimental	Control
Serotonin	+148	+9
GABA	+21	-19
PEA	+8	+40
Epinephrine	-2	-53

Changes in Behavior Problems

Child Behavior Checklist Subscale:	Percent Change	
	Experimental	Control
Attention Problems	-18	-1
Thought Problems	-33	+13
Other Problems	-23	+1

Changes in Behavior Problems

Child Behavior Checklist Subscale:	Percent Change	
	Experimental	Control
Anxiety/Depression	-29	-3
Externalizing Problems	-22	-6
Aggression	-21	-5

Authors and Acknowledgements