The Neurobehavioral (Cognitive) Effects of Consuming Dietary Tryptophan

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Background

- Tryptophan, an essential amino acid, serves as a precursor to serotonin synthesis with the rate of synthesis dependent on tryptophan concentrations in the brain (Fernstrom, 2013) and in the gut.
- Serotonin is involved in the regulation of neurobehavioral conditions. Furthermore, results are mixed on the effects of tryptophan and serotonin levels on cognitive function.
- Tryptophan is obtained through the diet rather than synthesized by the body (Soh & Walter, 2011). Therefore a controversial question exists as to whether dietary consumption of tryptophan has an impact on cognition in healthy individuals.

Purpose

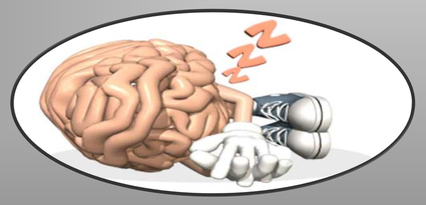
The purpose of this study was to examine the neurobehavioral (cognitive) effects of consuming dietary tryptophan on cognition scores in healthy young adults.

Sample

A sample of 25 participants were recruited for this within-subjects designed study.

Demographics (n = 25)

Demographics	Mean	SD
Age (years)	20.5	1.6
Education (years)	13.9	0.8
Health status	**Mean**	**SD**
Body Mass Index	23.5	2.9



Within-Subject Differences for High and Low Dietary Tryptophan Diets and a Control Diet

Variable	Mean	SD	*F*	*p*
Working Memory Reaction Time (with kilocalorie covariate)				
Low Tryptophan	59.5	59.3		
High Tryptophan	64.0	93.7	3.3	.05
Control	77.0	120.3		
Spatial Orientation Test (Scores)				
Low Tryptophan	15.3	5.9		
High Tryptophan	14.4	7.0	.53	.59
Control	15.3	5.5		
Serotonin				
Low Tryptophan	1.6	.20		
High Tryptophan	1.9	.44	2.0	.25
Control	2.0	.32		

*p ≤ .05; **p ≤ .01 n = 25

Acknowledgements

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Study Design

- Participants were randomly assigned to receive weighed food intakes of dietary tryptophan. Dietary treatments consisted of a high tryptophan diet, a low tryptophan diet and an un-manipulated (control) diet.
- Two week washout periods were included between the study diets to eliminate carry-over effects between the dietary interventions.

Methods

Demographic Questionnaire
Biochemical Laboratory Tests
Weighed Food Intakes of Tryptophan
Vandenberg Spatial Orientation Test (α=.88)
Sternberg Item Recognition (Working Memory) Test (α=.96)

Conclusions

- Working memory (reaction time) was significantly (p ≤.05) better (with covariate kilocalories) when participants consumed a low tryptophan diet in comparison to a high tryptophan or control diets.
- The MRT spatial orientation scores were not significantly (p > .05) different when comparing the high and low tryptophan and control diets.
- Consumption of the high and low tryptophan and control diets did not result in significantly different (p >.05) serotonin lab values.

Implications

This study can contribute to understanding the effects of diet on cognition with implications for promoting healthy behaviors.