# Sucrose, Brain Neurotransmitters and Behavior (SA-9-016/76)

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| Principal Investigator: | R. J. Wurtman, M.I.T., Department of Nutrition and Food Science |
| Monitor: | Dr. D. B. Coursin, chairman FNAC; St. Joseph Hospital, Lancaster, PA |
| Starting date: | 7/1/76; three-year project |
| Funding: | Year 1--$22,460; Year 2--$22,517; Year 3--$22,576; Total--$67,553 |

Rationale:

The functioning of the brain depends, in part, on chemicals known as neurotransmitters. Currently, there are four compounds which qualify as neurotransmitters; one of these is called serotonin.

Serotonin appears involved in such brain controlled decisions as hunger, sleepiness, establishing body temperature. These decisions depend on food consumption or nutritional input which thus assumes major importance in the regulation of animal and human behavior.

Serotonin is formed in the brain from an amino acid (tryptophan) and the amount of this amino acid available to the brain (in rats) is directly related to the amount of sucrose consumed.

Objectives:

This project has the following objectives:

1. to check the effect on brain functions and behavior of rats with serotonin levels increased by increasing sucrose intake;

2. to compare these effects in rats on feeding different carbohydrates: sucrose, dextrose, fructose, galactose, mannose, xylitol, sorbitol;

3. to expand these observations to humans.

Value:

We look for an improved understanding of brain function and behavior due to sucrose-provoked brain serotonin increase. Possibly, sucrose stimulated serotonin production will prove of therapeutic value, as in the releif of depression.

Status:

During the first few months of the project life, Wurtman has already showed that, as with glucose, orally fed sucrose increases brain serotonin levels in rats. Judging from Wurtman's observed effects of sucrose feeding on blood plasma constituents in the human it appears that ingestion of sugar by humans will also raise brain serotonin levels.

Wurtman has also started his experiments designed to study rat behavior. He has set up a system that will allow the determination of exactly how early consumption of sucrose modifies the subsequent tendency of the animal to choose to eat sucrose. His initial results with rats point towards the finding that a high sugar intake as an infant does not predispose one to high sugar intake as an adult.