Identification of the functional interactions between serotonin and dopamine on human attention and working memory functions

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This abstract describes an ongoing study on the effects of an acute depletion of tryptophan and tyrosine on attention and working memory functions in 24 healthy young volunteers, which is being conducted according to a double-blind, placebo controlled, four-way, cross-over design. The study is designed to further investigate the functional interactions between serotonin and dopamine neurotransmitter systems with regard to human attention functions and working memory. The effects of a lowering of serotonergic neurotransmission (by means of acute tryptophan depletion), lowering of dopamine neurotransmission (acute tyrosine depletion), and a combination of these manipulations on various attention functions and working memory will be assessed. The combined condition will provide insight in the role of serotonergic/dopaminergic interactions in the cognitive domains. Specifically, based on the above considerations, it is expected that the cognitive effects of low serotonin are attenuated by concomitant dopamine inhibition. This study will provide the first evidence of functional serotonergic-dopaminergic interactions with regard to human attention and working memory functions. Data collection is underway with completion anticipated by May 2004. It is hoped that preliminary results will be presented at the conference to address the central hypotheses of the study:

- An acute reduction of serotonergic neurotransmission by acute tryptophan depletion will improve selective attention, sustained attention and working memory performance in young healthy volunteers.
- An acute reduction of dopamine neurotransmission by acute tyrosine and phenylalanine depletion will impair selective attention, sustained attention and working memory performance in young healthy volunteers.
- The performance effects of reduced serotonergic neurotransmission are attenuated by concomitant lowering of dopamine neurotransmission.
- Neither manipulation will affect mood or alertness.

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