Uses of Tyrosine in Foods to Amplify Catecholamine Release

These studies have been part of an ongoing research program on the ability of certain nutrients to affect the production of their neurotransmitter products, and thereby to affect behaviors and other brain functions (e.g., control of blood pressure). The studies have focussed on the amino acid tyrosine - which is converted, in neurons or chromaffin cells, to dopamine, norepinephrine, and epinephrine. The effect of supplemental tyrosine on brain dopamine release has now been shown directly, using the new technique of in vivo microdialysis. Hemorrhage, per se, has been shown to raise neuronal tyrosine levels, probably reflecting a protective mechanism to sustain blood pressure. Adenosine and the amino acid alanine have now also been shown to modulate blood pressure - and adenosine to mediate some of the fall in blood pressure caused by hemorrhage. Various dipeptides & diketopiperazines have been shown to enhance dopamine release, either by providing tyrosine or by direct actions. In related studies, we have examined the interactions of dietary carbohydrates (which, acting via insulin, lower blood levels of other amino acids which compete with tyrosine for brain uptake) on effects of tyrosine, dopa, or tryptophan.

Subject Terms (Continue on reverse if necessary and identify by block number): Tyrosine; Nutrient; Catecholamine, Serotonin; Behavior.
Uses of Tyrosine in Foods to Amplify Catecholamine Release

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Research in my laboratory that was all or in part supported by AFOSR during the period 1987-1990 (Grant # AFOSR-87-0229) generated the following publications, which are grouped according to their content and described briefly below. (It should be noted that acknowledgement of AFOSR support is missing from some of them, because some journals—like Scientific American—do not, as a matter of policy, list acknowledgements.)

**Control by Tyrosine Levels of Catecholamine Synthesis & Release:**

- **Milner, J.D. and Wurtman, R.J.**

- **Milner, J.D., Irie, K., and Wurtman, R.J.**

- **Milner, J.D. and Wurtman, R.J.**

- **Milner, J.D., Reinstein, D.K. and Wurtman, R.J.**

- **Irie, K. and Wurtman, R.J.**

- **Acworth, I.N., During, M.J. and Wurtman, R.J.**

**Effect of Tyrosine on Maintenance of Blood Pressure**

- **Conlay, L.A., Maher, T.J. and Wurtman, R.J.**


**Effects of Other Circulating Nutrients on Maintenance of Blood Pressure**

- **Conlay, L. and Wurtman, R.J.**
Conlay, L.A., Maher, T.J. and Wurtman, R.J.

Use of In Vivo Microdialysis to Examine Effects of Tyrosine on Neurotransmitters

During, M., Acworth, I.N. and Wurtman, R.J.

During, M.J., Acworth, I.N. and Wurtman, R.J.

During, M.J., Acworth, I.N. and Wurtman, R.J.

Effects of Tyrosyl- or TRH-Derived Dipeptides on Catecholaminergic Neurotransmission

Maher, T.J., Kiritsy, P.J., Moya-Huff, F.A., Casacci, F., DeMarchi, F. and Wurtman, R.J.

Kreutz, M.R., Acworth, I.N., Lehnert, H. and Wurtman, R.J.

Effects of Exercise on Circulating Nutrients

Conlay, L., Wurtman, R.J., Maher, T.J., Lopez-Coviella, I., Blusztajn, J.K., Vacanti, C.A., Logue, M., During, M., Caballero, B. and Evoniuk, G.

Circadian Activity Rhythms: Effects of Age


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Inhibition by melatonin of dopamine synthesis in and release from superfused rabbit retina. (In preparation).

Interactions of Levodopa and Dietary Carbohydrates

Wurtman, R.J., Caballero, B. and Salzman, E.

Tryptophan Availability, Carbohydrate Intake, & Serotonin Release

Schaechter, J. and Wurtman, R.J.

Schaechter, J.D. and Wurtman, R.J.

Schaechter, J.D., LaFerrere, B. and Wurtman, R.J.

Schaechter, J.D. and Wurtman, R.J.
Serotonin release varies with brain tryptophan levels Brain Research (in press).

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Carbohydrates and Depression. Sci. American, Jan. '89, pp.68-75.


Review Articles

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Wurtman, R.J.