

## Regulation of green odor-mediated dopamine release

Hidehiko Yokogoshi and Yoko Kobayashi

*Department of Food and Nutritional Sciences, Graduate School of Nutritional and Environmental Sciences*

Green odors that are composed with 8 kinds of 6-carbon (C6) alcohols and aldehydes are present in plant foods, such as tomato, beans, and rice. Green odor compounds are widely used as food additives to reconstitute the plant flavor in processed foods. It is known that odors activate olfactory neurons following reception of olfactory signal from olfactory receptors. Our hypothesis is that the odor compounds found in some foods are taken into the body and transported via the blood stream to the brain, where they regulate brain function. In our research, we analyze the regulation of brain function by direct odor stimulation, not through the activation of the olfactory receptors.

The expression of brain function is regulated by neurotransmitters released by neurons. Rat brain slices enhanced neurotransmitter release after direct stimulation of green odor compounds. Especially, hexanal, C6 straight chain aldehyde, stimulated striatal slices to release a large amount of dopamine, one of the neurotransmitters<sup>1)</sup>. After acceptance of extracellular stimulation, dopamine is released from dopaminergic cells by exocytosis. Amphetamine, inducer of dopamine increments in synaptic clefts, stimulates the outward dopamine transport via monoamine transporters. PC12 cells are used as *in vitro* model of dopaminergic neuron, having ability of synthesis and release of dopamine. Using PC12 cells, the regulatory factors of dopamine release by hexanal were analyzed. When PC12 cells were treated with BAPTA-AM, membrane permeable Ca<sup>2+</sup> chelator, the amount of dopamine released by hexanal attenuated. However, extracellular Ca<sup>2+</sup> did not contribute to dopamine release by hexanal. Therefore, PC12 cells that were treated with reserpine, inhibitor of vesicular monoamine transporter, did not release dopamine by hexanal. These results suggested that the release of dopamine by hexanal was mediated by exocytosis and intracellular Ca<sup>2+</sup> was one of the regulators of dopamine release.

We hope to link the functions of the odors that are present in foods both to the prevention of brain and mental disorders and to the maintenance and improvement of human health.

1) Kako.H. *et al.* Brain Res. Bull. (in press)