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Developmental model of affective behavior concerning reduction-oxidation regulation in neonatal brain

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Abstract

Since the idea of orthomolecular psychiatry had been launched by Linus Pauling in 1968, it has been widely accepted as a useful tool for health care services and the preventive care especially in decreasing birthrate and highly aging societies. One critical issue is the regulation of reduction-oxidation (redox) state. Oxidative stress has been implicated in the development and pathogenesis of a number of diseases in neonates and especially those delivered prematurely. The key treatment process is to balance the impact of free oxygen and nitrogen radicals by supplying antioxidants from the diet or by micronutrient supplementation. Thus, we need an animal model to develop antioxidants supplementation during neonates. Here we developed an affiliation-deficit model using domestic chick (*Gallus gallus*) and coenzyme Q10 supplementation with social interaction training to ameliorate the deficit.

Domestic chick has provided an excellent model for affiliation study, since it is a precocial bird and able to take food by itself soon after hatching. We can regulate social environment to study very early capability of affiliation such as face and voice recognition and familiarity. Group-reared and socially isolated chick groups were prepared and their developments were examined to be different in terms of communication behavior and brain monoamine level. The supplementation of the reduced form of CoQ10 (QH) increased its serum-level and improved social affiliation behavior in the isolated chicks. Although the precise mechanism of the supplementation is uncertain, the acute application of QH affected brain redox state revealed by a small animal MRI with a nitroxide probe.

Biography

Shun Nakamura has completed his PhD at the age of 28 years from Tokyo University and postdoctoral studies from Cornell University at Ithaca, NY. He has published more than 120 papers in biochemical and neuroscience journals. He is a Professor Emeritus of Tokyo University of Agriculture and Technology and a gust researcher in National Center of Neurology and Psychiatry.