

## PROCEEDING

# Human nutritional science on stress control

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**Abstract : Severe and prolonged stress exposure impairs homeostatic mechanisms, particularly associated with the onset of depressive illness. The establishment of functional foods that correctly regulate stress response must be an important and new field for human nutrition. This exciting science has been vigorously achieving in the 21<sup>st</sup> century COE program of University of Tokushima Graduate School. J. Med. Invest. 52 Suppl. :223-224, November, 2005**

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## STRESSFUL SOCIETY

The proportion of senior citizens and children in relation to the general population is rapidly increasing and continuously decreasing, respectively, in Japan. Today the percentage of people over 65 in Japan is approximately 17%. With the development of an unbalanced and senior society, human activities and lifestyles generate numerous forms of environmental stress. This outstanding level of stress is certainly reflected by the number of Japanese people (more than 30,000) who commit suicide, and mental and physical disorders caused by stress are serious social and economic problems.

Stressful life events may contribute to the onset and course of mood deterioration and affective disorders such as depression (1, 2). Stress is a pervasive factor in everyday life that critically affects development and functioning. It has been hypothesized that stress exposure has important adaptive consequences by enhancing neurobehavioral ontogeny for virtually all animal species (3) . However, severe and prolonged stress exposure impairs homeostatic mechanisms that can aversively affect functioning

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of multiple organ systems. Stress appears to play a major role in the pathophysiology of nearly all psychiatric disorders particularly depressive illness(4-9).

## FUNCTIONAL FOOD

Food environment, such as eating styles or nutrients, greatly affects mental health especially in children and teenager. The need for medical treatment is expected to increase, but in many cases it may not improve the quality of life. Therefore, the goal of functional foods is to improve or maintain quality of life in mental health before medical treatment is required. The concept of functional food, particularly brain food, still has left much room for scientific arguments by professionals. Brain food is aimed at modifying genetic and psychological aspects of human life, and preventing as well as treating a growing number of stress-related mental disorders. The establishment of functional foods that correctly regulate stress response must be firmly based upon scientific knowledge and legal regulation. Therefore, efficient biomarkers related to pathological stress responses must be found. Furthermore, it is indispensable to conduct valid studies on humans.

## THE 21<sup>st</sup> CENTURY COE PROGRAM

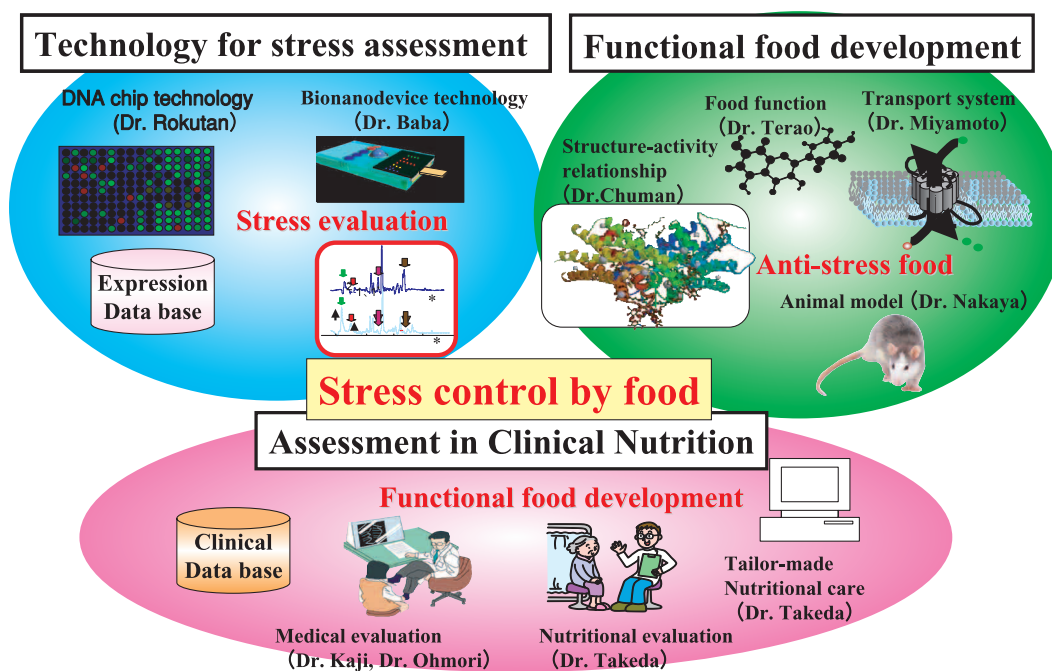


Figure. Strategy of COE program

The goals of the 21<sup>st</sup> century COE program "Human Nutritional Science on Stress Control" in University of Tokushima Graduate School are to develop a novel scientific field for human nutrition in stress research and to employ these strategies to examine the functions of foods on human mind (Figure). We have developed a novel method that makes it possible to simply, objectively evaluate human stress response using a microarray technique. Particularly, we have succeeded in detecting a gene expression profile characteristic of major depression in peripheral blood leukocytes. At the same time, we have been developing "nanobiodevices" to promptly measure these maker gene products. Based on our state-of-the-art technologies and outstanding achievements in human nutrition, this COE program will definitely meet the demands of society by establishing a new "biomental" technique to objectively measure pathological stress responses, introducing brain foods that correctly regulate stress responses, and developing an integrated system to open a new field of research.

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