Speaker

Okinawa Crisis: Recent Research Progress and Future Perspective in Metabolic Syndrome

Hiroaki Masuzaki MD., PhD

Division of Endocrinology, Diabetes and Metabolism, Hematology, Rheumatology, Graduate School of Medicine, University of the Ryukyus, Okinawa, Japan

An urgent task we must undertake to prepare for the coming super-aging society is to establish an active and healthy lifestyle for senior adults, (we Japanese sometimes call them the grand generation), which allows them to enjoy their own lives while passing on their knowledge and experience to the next generation, and to build medical and social systems to support it. Okinawa, which was once an island of the longest-lived people in the world, has ranked near the top of all Japanese prefectures in terms of the proportion of obese people and patients with type 2 diabetes mellitus in the recent decade, and the average lifespan of people in Okinawa has been rapidly decreasing in the same period (the Okinawa crisis). Analysis of the sudden deterioration in disease statistics and the current situation in Okinawa will provide a lot of information that will help us to envision a future of long and healthy lives in Japan.

A high-fat diet induces enhanced insulin resistance and excessive/prolonged secretion of insulin, increasing the risk for obesity and type 2 diabetes mellitus. High-fat meals, which are rare in the wild, disrupt the appetite control mechanism of the brain and cause hyperphagia, i.e., eating more than the calories the body needs. The similarity between the dependence on high-fat meals and drug addiction is also attracting attention. A patient with drug dependence increases the dose of his/her drug as the threshold of the brain reward system has been increased and his/her brain is no longer satisfied with the blood level of the drug at the time. Rats fed with high-fat meals, like ones with induced narcotic addiction, exhibit an increase in the stimulus threshold of the brain reward system (lateral hypothalamus) and cannot feel the rewards of eating in their brain. Reward signals (information on whether the brain is satisfied or not) are processed by dopamine neurons, but obese people exhibit reduced activity of dopamine D2 receptors in the striatum, the core of the reward system. A study in people with severe obesity based on functional MRI analysis revealed that their striatal neurons were not excited even after meals, demonstrating that they could not feel satisfied with eating in their brain.

In my talk, I try to make a brief on the scientific front of the metabolic syndrome, and also I would like to introduce you our ambitious challenge of natural food-based novel approach toward the prevention and treatment of obesity-diabetes syndrome.

References:

1. Effects of Brown Rice Diet on Visceral Obesity and Endothelial Function: The BRAVO Study
   Brtish J Nutr 12:1-11, **2013**
2. Brown rice and its components, γ-oryzanol, attenuate the preference for high fat diet by decreasing hypothalamic endoplasmic reticulum stress in mice.
   Diabetes 61:3084-3093, **2012**
3. Central melanocortin signaling restores skeletal muscle AMP-activated protein kinase phosphoylation in mice fed a high fat diet.
   Cell Metabolism 5:395-402, **2007**
4. Transgenic amplification of glucocorticoid action in adipose tissue causes high blood pressure in mice.
   J Clin Invest 112:83-90, **2003**
5. A transgenic model of visceral obesity and the metabolic syndrome
   Science 294: 2166-2170, **2001**

Profile

1989-1990	Intern in Medicine Kyoto University Chest Disease Research Institute Hospital, Kyoto, JAPAN
1996-1998	Research Associate Department of Medicine and Clinical Science Kyoto University Graduate School of Medicine
1998-2000	Assistant Professor Laboratory of Diabetes and Obesity Kyoto University Graduate School of Medicine
2000-2003	Visiting Assistant Professor Division of Endocrinology, Diabetes and Metabolism Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, USA
2003-2008	Assistant Professor Division of Endocrinology and Metabolism Kyoto University Graduate School of Medicine
2009-	Professor and Chairman Second Department of Internal Medicine, Graduate School of Medicine, University of the Ryukyus, Okinawa, JAPAN
2014-	Vice Director, Hospital of University of the Ryukyus