

JOINT EVENT

3rd International Conference on
ENDOCRINOLOGY AND METABOLIC SYNDROME
&12th International Conference on
ABDOMINAL IMAGING AND ENDOSCOPY

June 28-29, 2018 Amsterdam, Netherlands

**Hidekatsu Yanai***National Center for Global Health and Medicine, Japan***Effects of Non-Exercise Activity Thermogenesis (NEAT) on metabolic parameters in patients with type 2 diabetes**

Non-Exercise Activity Thermogenesis (NEAT) is the energy expenditure due to Physical Activities (PA) besides sports-like exercise and resistance training. It includes various activities in daily life such as going to work, attending school, and singing, dancing, washing clothes and cleaning floors. We developed the original questionnaire to evaluate NEAT in Japanese people, based on 2011 Compendium of Physical Activities produced by American College of Sports Medicine, by considering Japanese life-style and culture. The questionnaire consisted of 11 question items about locomotive activities and 25 question items about non-locomotive activities. We evaluated each questionnaire item with a score of 1 to 3 points in order of levels of daily PA and then added up the scores to determine the NEAT score. In our previous study using 45 subjects (22 women and 23 men) with type 2 diabetes who did not take any hypoglycemic, anti-hypertensive, or cholesterol-lowering agents, the NEAT score was negatively correlated with serum insulin levels ($r = -0.42$, $P < 0.05$). The NEAT score was also negatively correlated with waist circumference ($r = -0.509$, $P < 0.05$) and positively correlated with HDL-C levels ($r = 0.494$, $P < 0.05$) in women, and was negatively associated with serum insulin levels ($r = -0.732$, $P < 0.005$), systolic ($r = -0.482$, $P < 0.05$) and diastolic blood pressure ($r = -0.538$, $P < 0.05$) in patients with abdominal obesity. Our study demonstrated that NEAT is associated with amelioration in insulin sensitivity, waist circumference, HDL-C, blood pressure, in patients with type 2 diabetes. We examined the validity of our NEAT questionnaire by comparing with objectively measured daily PA by using the triaxial accelerometer. The NEAT score was significantly and positively correlated with PA Level (PAL) measured by the triaxial accelerometer ($r = 0.604$, $P < 0.001$). PAL was also significantly and positively correlated with both the locomotive NEAT score and the non-locomotive NEAT score ($r = 0.444$, $P = 0.001$ and $r = 0.526$, $P < 0.001$, respectively). The NEAT score measured by the self-reported questionnaire was highly correlated with PAL measured by the triaxial accelerometer. In type 2 diabetic women, the NEAT score was significantly and negatively correlated with Urinary Albumin Creatinine Ratio (UACR) ($r = -0.513$, $P < 0.05$) and positively correlated with coefficient of variation of R-R intervals (CVRR) ($r = 0.471$, $P < 0.05$). Our study suggested that NEAT is beneficially associated with markers for diabetic nephropathy and neuropathy in type 2 diabetic women. In patients with type 2 diabetes, multiple regression analysis, adjusted for age, gender, height and weight, revealed that hand grip strength was positively associated with total NEAT scores and locomotive NEAT scores. I summarized beneficial effects of NEAT on metabolic parameters. An increase of NEAT enhances muscle strength, reduces visceral adiposity and blood pressure, and improves insulin resistance and serum lipids, and is associated with lower risk of diabetic complications.

Biography

Hidekatsu Yanai is a Fellow of American College of Physicians (FACP), the Director of the Department of Internal Medicine and Clinical Research and Trial Center, National Center for Global Health and Medicine Kohnodai Hospital, Japan. He is also the Professor of Wayo Women's University, Japan. He obtained his MD and PhD degrees in National Defense Medical College and Hokkaido University School of Medicine, respectively. He studied as Invited PhD Research Fellow in the National Institutes of Health (NIH), USA. He is the Editor-in-Chief of *Journal of Endocrinology and Metabolism* and also an Editorial Board Member of 10 medical journals. He has 195 published English papers in refereed medical journals.

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