A NEAT Way to Prevent and Fight Diabetes

Dr Hidetaka Hamasaki, MD, PhD
A NEAT WAY TO PREVENT AND FIGHT DIABETES

Metabolic disease and in particular diabetes are the focus of Dr Hidetaka Hamasaki’s work at the National Center for Global Health and Medicine in Chiba, Japan. Dr Hamasaki and his team discovered a valuable lifestyle tweak that allows patients with reduced physical stamina to successfully improve their outcomes when it comes to diabetes management.

The chances of patients developing cardiovascular and metabolic diseases are dramatically increased if they are overweight. In 2012, the International Diabetes Federation found that more than 400 million people worldwide have diabetes. In 2015, the Federation estimated that this figure was 415 million people, of which 90% are affected by type 2 diabetes. By 2030, the number of patients suffering from diabetes will reach more than half a billion people. More than three quarters of these individuals live in Western countries, where the incidence of type 2 diabetes has been constantly increasing during the past few years. On a worldwide scale, almost five million patients succumb yearly to the consequences and complications of the disease. Type 2 diabetes is caused by insulin resistance, a condition preventing cells to respond appropriately to the release of insulin in the body. What is worrying for scientists is that more than 63% of people living in the United States and Europe are overweight or obese. Currently, almost a tenth of the adult population of the world is affected by the disease, in equal proportions of men and women.

One of the major problems for diabetes patients is that they have lower physical stamina than healthy individuals. In other words, it is more difficult for them to maintain the healthy exercise level that is recommended by physicians to keep their disease in check. Against this backdrop, Dr Hidetaka Hamasaki became interested in defining finding better ways for diabetes patients to augment their lifestyles and disease fighting routines. “The recommended intensity and duration of exercise, which is at least 150 minutes per week of moderate to vigorous intensity aerobic exercise combined with resistance training, may be a considerable physical burden to older patients with type 2 diabetes or with diabetic complications, and lead to cessation of exercise therapy because they have a lower physical performance threshold than healthy individuals. Non-exercise activity thermogenesis (NEAT) consists of mostly light to moderate intensity physical activity, and continues without cessation for as long as we live. To clarify the beneficial effects of NEAT on patients with type 2 diabetes will be helpful for the management of type 2 diabetes,” he explains.

Using NEAT to Improve Patient Outcomes

Dr Hamasaki works as a physician with the Department of Internal Medicine, National Centre for Global Health and Medicine, Kohnodai Hospital, Japan. He completed his residency in medicine in 2010 and obtained his PhD in 2016 in healthcare. His main research interests are diabetes, endocrinology, physical activity, and non-exercise activity thermogenesis. He became interested in non-exercise activity because he knew that light physical activity accounts for most of the variation in daily energy expenditure between individuals. NEAT physical activity is defined as non-exercise motion such as washing dishes, cleaning the floor, walking to work, typing, gardening, typing on a keyboard, or fidgeting. To generalize, NEAT is anything that requires spending energy and is not sleeping, eating, or doing anything similar to sports.

Although previous studies had found a link between the reduction of obesity and non-exercise activity, prior to Dr Hamasaki’s work it was not clear whether the metabolic risk factors in pre-diabetic stages and untreated early type 2 diabetes can be mitigated through this type of activity. In a series of studies, Dr Hamasaki demonstrated that non-exercise activity increases insulin sensitivity, favours waist circumference reduction, aids in lowering blood pressure in patients with type 2 diabetes, and helps increasing high density cholesterol. In order to improve the accuracy of measuring non-exercise activity undertaken daily by the patients, he and his colleagues are preparing new experiments using omnidirectional accelerometers capable of precisely determining and reporting it.

In 2013, Dr Hamasaki found correlations between the metabolic characteristics of individuals and their level of non-exercise activity in a study on 45 Japanese type 2 diabetes patients. We studied 45 subjects who did not take any hypoglycemic, anti-hypertensive, or cholesterol-lowering agents and asked them about NEAT using an original questionnaire modified from a compendium of physical activities. We studied the association of the NEAT score to body weight, waist circumference, blood pressure, glucose and lipid metabolism, and arterial stiffness,” Dr Hamasaki told us. What they found was that a higher level of NEAT was associated with a reduction in waist circumference and lower serum insulin levels, which means an increase in sensitivity to insulin. At the same time, non-exercise activity correlated with increased high density cholesterol levels. The researchers also found that this type of activity is associated with lower blood pressure in patients with abdominal obesity. Finally, yet importantly, smokers undertaking non-exercise activities had a lower pulse wave velocity – an important indicator of cardiovascular health.

“NEAT plays an important role for treating type 2 diabetes as well as obesity. It also has favourable associations with metabolic parameters in patients with type 2 diabetes and glucose intolerance. Stand up, and increase NEAT!”
mental disorders can gain major benefits from non-exercise activity. In 2016, Dr Hamasaki published a paper showing that patients with
making a good lecture for all those interested in diabetes intervention.
and the multiple benefits of non-exercise activity are presented.
Because of its structure and language, the paper is accessible to a
to the worldwide obesity pandemic and this argument
A paper published by Dr Hamasaki’s colleagues, called ‘Nonexercise
activity thermogenesis is associated with markers for diabetic
in high density cholesterol and a decrease in the levels of glycated
was higher in patients with mental disorders, which is why NEAT methods could prove a valuable aid to them. Dr Hamasaki studied 150 type 2 diabetes patients out of which 50 also had a mental illness, such as schizophrenia or mood disorders, between September 2010 and September 2014. Although the levels of non-exercise activity in mentally ill patients were much lower than those of patients who only had diabetes, the results suggested that NEAT would be beneficial for the management of obesity, insulin sensitivity, and lipid profiles in patients with mental disorders. In particular, patients with schizophrenia showed an increase in high density cholesterol and a decrease in the levels of glycated haemoglobin, an important marker of how well diabetes is controlled. Earlier this year, Dr Hamasaki also found a correlation between handgrip strength and non-exercise activity thermogenesis in patients with type 2 diabetes.

Next Steps
Although Dr Hamasaki made several important findings showing the benefits of non-exercise activity to patients with metabolic
It is well known that such patients are less able to take care of their health and often have worse metabolic situations than patients without
to ensure that the results he obtained were correct. His biggest doubt was that the methodology based on reporting activity levels via a self-assessed questionnaire was insufficiently accurate. Therefore, in order to validate the results he had obtained in 2013, he started a new study with the purpose of comparing a automated measurement and reporting methods with the questionnaires he had previously used. To do so, he measured the level of non-exercise activity by triaxial accelerometers and self-administered questionnaires simultaneously, and then he compared the two sets of data. By this procedure, he was able to confirm that the questionnaire answers are highly correlated with the results reported by accelerometry, and therefore they can be used in clinical practice on a regular basis.

Dr Hamasaki continued his work with a study on 60 patients without diagnosed heart failure and renal impairment. He describes the motivation behind the study: “In spite of accumulating evidence suggesting an inverse association between insulin resistance and plasma B-type natriuretic peptide (BNP), the effect of daily physical activity on plasma BNP in individuals with glucose intolerance remains unknown. We investigated the association of physical activity level (PAL) with plasma BNP in patients with impaired fasting glucose, impaired glucose tolerance and type 2 diabetes. Our findings propose the possibility that plasma BNP may be increased by daily physical activity and that BNP is associated with insulin resistance.”

A paper published by Dr Hamasaki’s colleagues, called ‘Nonexercise Activity Thermogenesis in Obesity Management’, explains several key factors of NEAT. Firstly, a strong case is made for using non-exercise activity due to the worldwide obesity pandemic and this argument is supplemented by showing the daily energy expenditure that can be obtained through this type of intervention. In this paper, the mechanism of action and how NEAT changes the brain for the better, and the multiple benefits of non-exercise activity are presented. Because of its structure and language, the paper is accessible to a general public and, moreover, it is available online as open access, thus

References
H Hamasaki, O Ezaki, H Yanai, Nonexercise Activity Thermogenesis is Significantly Lower in Type 2 Diabetic Patients With Mental Disorders Than in Those Without Mental Disorders: A Cross-sectional Study, Medicine (Baltimore), 2016, 95, e517.