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"Better" Hormones Through Diet and Exercise

Weight loss – by change in diet or in combination with physical exercise – has a positive impact on the production of adipose tissue hormones: Adipose cells produce less leptin but, instead, more adiponectin, which counteracts diabetes and cancer. These changes explain, at a molecular level, the health-promoting effect of physical exercise and dietary changes. Heidelberg cancer researchers have published their results in collaboration with colleagues from the U.S.A.

Overweight couch potatoes live a dangerous life: Epidemiologists estimate that about 80 percent of the most common diseases are linked to severe overweight and obesity and a sedentary lifestyle. Obese people are at an increased risk for cardiovascular diseases, vascular diseases, hypertension, diabetes and cancer. This lowers their life expectancy. Weight loss and physical activity help to counteract this. Women who lose weight lower their breast cancer risk. Regular physical activity lowers the risk of developing breast, colorectal and cervical cancers.

The links between body weight, lifestyle and the risks of developing cancer and other chronic diseases are not yet understood in every detail. However, changes in hormonal signaling are believed to be among the culprits of these processes. "Adipose tissue produces various hormones which have a great impact on metabolism," says Prof. Dr. Cornelia Ulrich. "The important ones are anti-inflammatory adiponectin, which increases the effect of insulin, and leptin, which can promote tumor cell growth.

Do body weight and exercise also affect production of these key adipose tissue hormones? Cornelia Ulrich, departmental head at DKFZ and director of the National Center for Tumor Diseases (NCT) Heidelberg, analyzed this in a randomized controlled study with 439 overweight postmenopausal women (> 50 years). Study participants were divided into three "intervention groups" (diet; exercise; diet+exercise) as well as a control group. These groups were watched intensively over a period of one year so that the results obtained are particularly valuable.

"Our hypothesis was that particularly a combination of physical activity and weight loss should result in a more favorable relation of the two hormone levels," said Cornelia Ulrich. Leptin production decreased in all three intervention groups, most noticeably (up to 40 percent) in the diet+exercise group. By contrast, adiponectin production increased most in women who were on a reduced calorie diet only.

Irrespective of the type of intervention, the positive effect on hormone production was dependent on the degree of weight loss: The more kilos a study participant had lost, the more her adiponectin levels increased and the more her leptin levels decreased. "We observed the greatest changes in women who had lost ten percent of their initial body weight," says Dr. Clare Abbenhardt, first author of the study. "Some of these participants reached a 20 percent increase in adiponectin levels and their leptin decreased by more than 50 percent."

Leptin production appears to be influenced by mere changes of body composition, because in the exercise intervention group, participants gained muscle mass also without losing weight.

“We now have a better understanding of the mechanisms by which weight loss and training protect from chronic diseases. The health-promoting effect of adiponectin is regarded as established by numerous studies now. Lower leptin levels, on the other hand, offer less growth stimuli for tumor cells. Therefore, we are now able to give well-founded recommendations to women how they can positively influence these two important metabolic regulators,” says Cornelia Ulrich, “by keeping a healthy body weight and getting more exercise!”

The research was undertaken in collaboration with scientists from several U.S. universities at the Fred Hutchinson Cancer Research Center in Seattle, U.S.A.

Clare Abbenhardt, Anne McTiernan, Catherine M. Alfano, Mark H. Wener, Kristin L. Campbell, Catherine Duggan, Karen E. Foster-Schubert, Angela Kong, Adetunji T Toriola, John D. Potter, Caitlin Mason, Liren Xiao, George L. Blackburn, Carolyn Bain and Cornelia M. Ulrich: Effects of individual and combined dietary weight loss and exercise interventions in postmenopausal women on adiponectin and leptin levels. Journal of Internal Medicine, 25 February, 2013

A picture for this press release is available at:
www.dkfz.de/de/presse/pressemitteilungen/2013/images/NCT_Patientensportprogramm_Joggen.jpg

Source: Media Center of Heidelberg University

The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) with its more than 2,500 employees is the largest biomedical research institute in Germany. At DKFZ, more than 1,000 scientists investigate how cancer develops, identify cancer risk factors and endeavor to find new strategies to prevent people from getting cancer. They develop novel approaches to make tumor diagnosis more precise and treatment of cancer patients more successful. The staff of the Cancer Information Service (KID) offers information about the widespread disease of cancer for patients, their families, and the general public. Jointly with Heidelberg University Hospital, DKFZ has established the National Center for Tumor Diseases (NCT) Heidelberg, where promising approaches from cancer research are translated into the clinic. In the German Consortium for Translational Cancer Research (DKTK), one of six German Centers for Health Research, DKFZ maintains translational centers at seven university partnering sites. Combining excellent university hospitals with high-profile research at a Helmholtz Center is an important contribution to improving the chances of cancer patients. DKFZ is a member of the Helmholtz Association of National Research Centers, with ninety percent of its funding coming from the German Federal Ministry of Education and Research and the remaining ten percent from the State of Baden-Württemberg.

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