

## **Exercise and heart disease: (Too) much does not help a lot**

**How much physical activity provides the best chances of preventing a new infarction or stroke in heart disease patients? Scientists from the German Cancer Research Center (DKFZ) have discovered that moderate exercise twice to four times a week yields the greatest benefit. Less than this, or no exercise at all, is associated with a significantly higher risk. However, patients should not do too much: The risk for patients who work out every day is higher than for those who are moderately active.**

Numerous studies have shown that physical activity reduces a person's risk of developing cardiovascular disease. Physical exercise is also recommended for patients who have been diagnosed with heart disease to prevent a worsening of their condition. In the United States, for example, clinical specialist associations recommend from 30 to 60 minutes of moderately intense aerobic activity on five or, even better, seven days per week. These recommendations are based on outcomes from clinical trials that were conducted to examine the effectiveness of cardiac rehabilitation exercise programs, which are supervised and usually have a limited duration of a few months.

Dr. Ute Mons and Professor Hermann Brenner at the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) aimed to find out whether these recommendations are also valid under patients' normal living conditions. "We wanted to verify whether there is really a linear association between the frequency of physical activity and a prognosis," Mons explains. "In addition, most prior studies have not taken into account whether or not patients adhere to the prevention recommendations over a period of several years."

To answer these questions, the epidemiologists conducted a 10-year survey involving more than 1,000 patients who had participated in a clinical rehabilitation program for coronary heart disease (myocardial infarction or acute coronary syndrome). Study participants were asked to complete questionnaires on their physical activity at intervals of 1, 3, 6, 8 and 10 years after their hospital stay. The study documented all new cardiovascular complications (infarction, stroke) that occurred over these periods of time.

In their evaluation of the data, the researchers noticed that most patients had not maintained an initial level of activity as the years passed and they grew older. The proportion of participants who exercised daily or at least 5-to-6 times a week continuously declined, while the proportion of those who rarely exercised rose.

The DKFZ epidemiologists defined a reference group of patients who reported that they exercise twice to four times a week, representing the average level of activity. As expected, the risk was highest in patients who rarely or never exercised (this group experienced four times more deaths related to cardiovascular incidents than in the reference group), followed by those who exercised only one to four times a month.

However, the number of severe cardiovascular events among patients who exercised every day also was about twice that of the reference group. This non-linear association (which could be mapped on a reversed "J"-shaped curve) was particularly obvious when the scientists looked only at cases of infarctions and strokes with fatal outcome.

The researchers can only provide speculations about the causes of the rise in the risk for patients in the group that was physically most active. Since the study did not document the exact circumstances of death, they could not determine whether the elevated risk in this group was associated with sudden cardiac death during or immediately after physical exercise.

"Our analysis may overestimate the risk for patients in the physically most inactive group," Brenner states, "because people who are already sick and in a weak condition will not exercise. There is no doubt that moderate physical activity, if possible in a patient's case, has health benefits. However, our results also suggest that there is a limit beyond which more exercise does not provide any benefits. This should be taken into account in clinical recommendations for the secondary prevention of cardiovascular disease."

Ute Mons, Harry Hahmann and Hermann Brenner: A reverse J-shaped association of leisure-time physical activity with prognosis in patients with stable coronary heart disease: evidence from a large cohort with repeated measurements. *Heart* 2014, DOI: 10.1136/heartjnl-2013-305242

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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