

SOUTHWESTERN NEWS

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SIX MONTHS OF EXERCISE REVERSES DECLINE IN PHYSICAL CONDITIONING ASSOCIATED WITH AGING, UT SOUTHWESTERN RESEARCHERS REPORT

DALLAS – Sept. 18, 2001 – Six months of exercise can reverse the decline in physical conditioning associated with aging, researchers at UT Southwestern Medical Center at Dallas reported in a 30-year follow-up to the 1966 landmark Dallas Bed Rest and Training Study.

The researchers also report that three weeks of bed-rest deconditioning has a more profound impact on physical work capacity than 30 years of aging.

Their findings are based on test results of the five healthy men, ages 50 to 51, who were originally studied in 1966 and volunteered to participate in the 30-year follow-up, which began in 1996. The study represents one of the longest longitudinal evaluations of a group's response to exercise and provides novel findings regarding the effects of two endurance training programs separated by a 30-year period.

The 1966 study, considered one of the most pivotal studies in exercise science, evaluated the response to endurance exercise training after a 20-day period of bed rest. The two-part, follow-up study, which is reported in today's issue of *Circulation: Journal of the American Heart Association*, evaluates the effect of age on cardiovascular response to exercise testing, and the effect of age on cardiovascular adaptation to endurance exercise training.

"This pair of studies together underscore the relationship between physical activity and cardiovascular fitness, or aerobic power," said Dr. Darren McGuire, assistant professor of internal medicine and lead author of the study.

"First, 20 days of bed rest – which is the ultimate 'sedentary' state – in these subjects when they were 20 years old had a more profound negative impact on their cardiovascular fitness than did 30 years of aging," McGuire said.

"Second, an endurance training program using a relatively modest intensity of training

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was able to reverse 100 percent of the loss of cardiovascular capacity, returning the group to their 1966 baseline levels of aerobic power.”

The five study volunteers completed a six-month, individualized endurance training program. Two study participants took part in walking exercises, two jogged and the fifth trained on a stationary bicycle. The endurance training was increased weekly.

“By the end of the study, the subjects were exercising weekly about 4 ½ hours divided into four to five exercise sessions,” McGuire said.

Notable changes in the five participants from 1966 to 1996 included weight gain, and a more than doubling in body fat. Only two of the five volunteers were following a regular exercise regimen prior to the follow-up study. The remaining three had not performed regular exercise in six months to 20 years before the present study.

“This study clearly provides evidence that even an older person who has failed to maintain fitness over time can benefit from an exercise program,” said Dr. Benjamin Levine, associate professor of internal medicine and director of the Institute for Exercise and Environmental Medicine, a joint venture between UT Southwestern and Presbyterian Hospital of Dallas.

“Starting an exercise program when you are older is still useful and can combat the effects of aging,” said Levine, who is also a study co-investigator.

“Moreover, if you stop exercise you can lose what you have gained relatively quickly. Therefore, exercise must be a lifelong health habit – like brushing your teeth or taking a shower – that can and should be sustained throughout life.”

The researchers also found that age plays a factor in the mechanisms involved in age-related decline in aerobic power. The investigators report that in middle-aged adults the mechanisms responsible for decline in cardiovascular capacity are directly related to peripheral oxygen extraction, the body’s ability to receive, take up and use oxygen.

In the 1966 study, the then 20-year-old volunteers improved their maximal ability to perform exercise by increasing the amount of blood that the heart could pump, and by increasing

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the amount of oxygen that could be extracted. In the present study the volunteers were only able to increase the amount of oxygen the muscles extracted.

“This difference may reflect a reduced plasticity of heart muscle as compared to the skeletal muscle due to aging. Though it is not clear if an even longer period of training might have had different effects,” Levine said.

Other research team members include three of the original investigators, Drs. Gunnar Blomqvist, professor of internal medicine and physiology and director of the National Aeronautics and Space Administration’s Specialized Center of Research Training in Physiology at UT Southwestern; Jere Mitchell, clinical professor of internal medicine and physiology; and Bengt Saltin, director of the Copenhagen Muscle Research Centre in Denmark.

Other co-investigators of the 1996 study include Dr. Peter Snell, associate professor of internal medicine, and Dr. Jon Williamson, associate professor of physical therapy.

The endurance tests were performed by technicians at the Institute for Exercise and Environmental Medicine at Presbyterian.

The researchers dedicated the paper to Dr. Carleton Chapman, who initiated the original study 35 years ago. He died last December. Chapman was chief of cardiology at UT Southwestern and later became dean of Dartmouth Medical School.

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