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Soccer reduces risk of falls and bone fractures

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The observed improvements in bone mineral density, strength and postural balance due to recreational soccer are of particularly interest for a large group of women but also for elderly men, says project leader Associate Professor Peter Krustrup, University of Copenhagen, and continues "It is well known that the risk of falls and fractures increases with age as a result of weaker bones, poorer balance and attenuated ability to trigger rapid muscle force, but the present results suggest that soccer - and possibly other ball games - is an effective training method to reduce bone weakening that comes with increasing age".

Better bones from soccer than from running

A 14-week study in which women aged 20-47 years trained soccer twice a week showed marked increases in bone density in the left and right tibia. Furthermore, soccer training showed an elevated mass of the calf muscle, greater muscle strength, and an improved balance. A 16-months training intervention for the same subject group showed that prolonged soccer training for untrained premenopausal women elevates whole-body bone mineral density. The women who participated in the study had never played soccer before, implying that all can benefit from soccer. Interestingly the short- and long-term training effects on bone mineral density were greater for the soccer players than for a similar group of runners and an inactive control group.

"During soccer training and games, the players perform many sprints,

turns, kicks and tackles. This combination of actions help achieve a variable bone impact that appears to provide a better stimulus to bone mineralisation than running," explains project leader Peter Krustrup.

Little training required

Small-sided soccer games for 1 hour two to three times a week during 12 weeks for untrained men aged 20-40 years resulted in significant increases in muscle mass and leg bone mass, whereas no effects occurred for the inactive control group. The postural balance was improved as well. In a follow-up study on long-term effects of soccer for men, it was demonstrated that 64 weeks of training have an additional effect on both muscle mass and leg bone mineral density. These effects were observed despite the fact that the training volume was reduced significantly. After the first 12 weeks the training frequency was only 1.3 times per week, indicating that a relatively small amount of training can nevertheless affect bone strength in the longer term.

70-year-old men as fit as 30-year-olds

The research group has also examined muscle function and postural balance in a group of 65-75 year old men who have played recreational soccer most of their lives and compared the values with a group of men at the same age without specific training and a group of 30-year-old untrained men.

"The research shows that 70-year-old men, who have played soccer most of their lives on a recreational basis, have just as good a balance and rapid muscle strength as untrained 30-year-olds and much better balance and muscle strength than their peers," says Peter Krustrup.

As an example, the untrained older men had more than twice as many

falls in a one-leg balance test, compared to the soccer-trained older men and untrained young men.

Led by Professors Peter Krustrup and Jens Bangsbo from Department of Exercise and Sports Sciences, University of Copenhagen, Denmark, 50 researchers from seven countries have studied the physical, psychological and social aspects of soccer and the results are remarkable. 14 scientific articles from the soccer project will be published in a special issue of the *Scandinavian Journal of Medicine and Science in Sports* in March 2010. The articles dealing with the risk of falls and fractures are written by Helge et al., Randers et al., Sundstrup et al. and Krustrup et al. The research project has received funding from FIFA - Medical Assessment and Research Centre (F-MARC), The Danish Ministry of Culture, TrygFonden, United Federation of Danish Workers (3F), The Danish Football Association (DBU), Team Denmark and The Danish Sports Confederation (DIF).

The researchers have specific plans to examine the effect of soccer on other patient groups such as people with diabetes II and cancer. The research group is also planning follow-up studies of the long-term effects of soccer on preliminary stages of osteoporosis, on high blood pressure for middle-aged men and women as well as the cardiac and musculoskeletal health effects of youth soccer. A planned collaboration with an international network of researchers from, among others, England, Italy, Portugal, Switzerland, Germany, Norway, Sweden, USA, Kenya and Iran will examine the cardiovascular and musculoskeletal effects of soccer and other ball games such as basketball, handball, volleyball and floorball on inactive and overweight children and inactive elderly people.

Provided by University of Copenhagen