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Cardiovascular fitness in young males predicts risk of idiopathic venous thromboembolism in adulthood

Bengt Zöller(1), H Ohlsson(1), J Sundquist(1,2), K Sundquist(1,2)

(1) Center for Primary Health Care Research, Lund University/Region Skåne, Malmö, Sweden

(2) Stanford Prevention Research Center, Stanford University School of Medicine, Stanford, CA, USA

Corresponding author: Dr Bengt Zöller, Lund University/ Region Skåne, Center For Primary Health Care Research, Malmö, Sweden. E-mail: bengt.zoller@med.lu.se

Background & Aim: Venous thromboembolism (VTE) is the third most common cardiovascular disorders. Whether cardiovascular fitness, i.e. the result of physical activity, is associated with risk of VTE is unknown. The present nationwide study aims to determine whether cardiovascular fitness in male conscripts is a predictor of idiopathic VTE.

Method: A Swedish cohort of male conscripts (n=773925) born in 1954-1970 with no history of previous VTE were followed from enlistment (1972-1990) until 2010.

Data on cardiovascular fitness using a cycle ergonometric test (maximum work rate in Watt=Wmax) at conscription were linked with national hospital register data to calculate future risk of VTE requiring in-patient care. Maximum work rate were adjusted for weight (Wmax/kg), which reflects maximum oxygen consumption. Using the Swedish Multi-Generation Register, we identified all full-siblings and first-cousin pair discordant for Wmax/kg. This co-relative design allows for adjustment for shared genetic or environmental factors. Main outcome was unprovoked first event of hospitalized VTE. Secondary cases of VTE due to cancer, fracture, trauma and surgery were excluded.

Results: In total 3005 (0.39%) males were affected by VTE. Cardiovascular fitness was associated with risk for VTE (Hazard ratio =HR 0.76 95% confidence interval 0.73-0.79 per standard deviation [SD] increment). Individuals with a Wmax/kg above two SDs had a HR of 0.58 (0.54-0.63), and those with a Wmax/kg below two SDs had a HR of 1.72 (1.59-1.86). The association was weaker when examining discordant full-sibling pairs (HR= 0.86 95% CI 0.79-0.94). Discordant first-cousin pairs had a HR of 0.82 (0.77-0.88).

Conclusions: This study shows an association with objectively tested cardiovascular fitness and risk of VTE. The effect of cardiovascular fitness remained during follow-up. Thus, good cardiovascular fitness at young age may prevent VTE in adulthood, suggesting the importance of physical activity in young people.