

Determinants of Peak Bone Mass in Men

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- I. Rudäng, R*, Ohlsson, C*, Odén, A, Johansson, H, Mellström, D, Lorentzon, M. Hip fracture prevalence in grandfathers is associated with reduced cortical cross-sectional bone area in their young adult grandsons. *the Journal of Clinical Endocrinology and Metabolism*, March 2010, 95(3): 1105-1114.
* contributed equally
- II. Rudäng, R, Mellström, D, Clark, E, Ohlsson, C, Lorentzon, M. Advancing maternal age is associated with lower bone mineral density in young adult male offspring. *Osteoporosis International*, 2012, 23:475-482.
- III. Rudäng, R, Darelid, A, Nilsson, M, Nilsson, S, Mellström, D, Ohlsson, C, Lorentzon, M. Smoking is associated with impaired bone mass development in young adult men: A 5-year longitudinal study. *the Journal of Bone and Mineral Research*, Vol. 27, No. 10, October 2012, pp 2189-2197.
- IV. Rudäng, R, Darelid, A, Nilsson, M, Mellström, D, Ohlsson, C, Lorentzon, M. X-ray verified fractures are associated with finite element analysis derived bone strength and trabecular microstructure in young adult men. Manuscript

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ABSTRACT

Objective: The aim of this thesis was to identify, investigate and evaluate hereditary and environmental factors associated with peak bone mass or bone development in men.

Method: All studies in the thesis were performed within a well-characterized population-based cohort of 1068 men between 18 to 20 years of age at baseline (the Gothenburg Obesity and Osteoporosis Determinants (GOOD) study). Measurements of bone mass, bone geometry, microstructure and estimated bone strength were assessed using dual-energy X-ray absorptiometry (DXA), peripheral quantitative computed tomography (pQCT), and high-resolution pQCT with applied finite element analysis. A self-administered questionnaire was used to collect information about physical activity, calcium intake, smoking and fracture prevalence. For evaluation of heredity and maternal factors, various Swedish registers were used, and fracture prevalence was verified in local hospital X-ray records.

Results: Family history of a grandfather with hip fracture was associated with reduced areal bone mineral density (aBMD) and cortical bone size in 19-year-old men. Advancing maternal age was a negative predictor of lumbar spine aBMD in 19-year-old men, independently of the possible confounders known to affect bone mass in late adolescence. Young men who started to smoke in young adulthood developed lower aBMD at several sites as well as lower trabecular density and smaller cortical cross-sectional area, than their nonsmoking peers. Prevalent fractures in young adult men were associated with impaired trabecular microstructure at the radius, independently of aBMD and cortical thickness.

Conclusion: We identified heredity over two generations, high maternal age, smoking and prevalent fractures as predictors of low peak bone mass. We suggest that these factors could possibly affect the risk of osteoporosis and fracture later in life.

Keywords: peak bone mass, bone mineral density, bone geometry, microstructure

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