

Blood and Bone – Epidemiological studies on the association between blood and bone

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligen försvaras i Hörsal Arvid Carlsson, Medicinaregatan 3, Göteborg, den 28 maj 2021, klockan 9.00

av Hallgerður Lind Kristjánsdóttir

Fakultetsopponent:

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Avhandlingen baseras på följande delarbeten

- I. **Kristjánsdóttir H.L.**, Lewerin C., Lerner U.H., Waern E., Johansson H., Sundh D., Karlsson M., Cummings S.R., Zetterberg H., Lorentzon M., Ohlsson C., and Mellström D. High Serum Serotonin Predicts Increased Risk for Hip Fracture and Nonvertebral Osteoporotic Fractures: The MrOS Sweden Study. *J Bone Miner Res*, 2018; 33(9): 1560-1567.
- II. **Kristjánsdóttir H.L.**, Lewerin C., Lerner U.H., Herlitz H., Johansson P., Johansson H., Karlsson M., Lorentzon M., Ohlsson C., Ljunggren Ö., and Mellström, D. High Plasma Erythropoietin Predicts Incident Fractures in Elderly Men with Normal Renal Function: The MrOS Sweden Cohort. *J Bone Miner Res*, 2020; 35(2): 298-305.
- III. **Kristjánsdóttir H.L.**, Mellström D, Johansson P, Karlsson M, Vandenput L, Lorentzon M, Herlitz H, Ohlsson C, Lerner U.H., and Lewerin C. High platelet count is associated with low bone mineral density: The MrOS Sweden cohort. *Osteoporos Int*, 2021; 32: 865-871.
- IV. Johansson P, **Lind Kristjánsdóttir H**, Johansson H, Jakir A, Mellström D, and Lewerin C. Increased Risk of Hip Fracture in Patients with Lymphoma, a Swedish Population Study of 37,236 Lymphoma Patients. *Calcif Tissue Int*. 2020;106(6):591-598

**SAHLGRENKA AKADEMIN
INSTITUTIONEN FÖR MEDICIN**



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Introduction: Preclinical and clinical studies have suggested that blood- and bone cells are interconnected.

Aims: To study the association between hematological variables, specifically serotonin, erythropoietin (EPO), hemoglobin (Hb), neutrophil-, lymphocyte-, and platelet count, and bone mineral density (BMD), and/or risk for fractures (paper I-III). To study the risk for hip fractures in patients with lymphoma (paper IV).

Methods: In paper I-III data from MrOS (The Osteoporotic Fractures in Men Study), a prospective, population-based study, was used. Men between 69-81 years old were randomly selected from Gothenburg (n=1010), 2002-2004. In the second part of paper I, additional cohorts from Uppsala and Malmö were used. Baseline data included blood tests (serotonin, EPO, Hb, neutrophil-, lymphocyte- and platelet count) and dual x-ray absorptiometry (DXA). Subjects were followed until the end of 2013. In Paper IV adults ≥ 18 years diagnosed with lymphoma between 1995 and 2015 were identified in the Swedish Cancer Registry (SCR). Data on the Swedish population and lymphoma patients was retrieved from Statistiska Centralbyrån (SCB) and hip fractures were identified via the Inpatient Register. The risk for hip fractures in patients with lymphoma was compared to that of the Swedish population.

Results: Serotonin was negatively associated with total hip BMD. Men with serotonin in quintile 5 had increased risk for all fractures, nonvertebral osteoporotic fractures and hip fracture. In men with normal renal function EPO was positively associated with total hip BMD, inflammation, and comorbidities, as well as increased risk for all fractures and major osteoporotic fractures. Platelet- and neutrophil count, and not Hb and lymphocyte count, were negatively associated with total hip BMD. Women with lymphoma had increased risk for hip fracture compared with the Swedish population.

Conclusions: The results support the hypothesis that blood and bone are interconnected. Serotonin and EPO both predict for fractures in elderly men. Platelet- and neutrophil count are associated with BMD. Physicians treating lymphoma patients should be aware of the increased risk for hip fractures in women.

Keywords: blood, bone, fractures, osteoporosis