Background: Postmenopausal osteoporosis (PO) and cardiovascular disease (CVD) are processes with an inflammatory background. There are common risk factors leading to bone resorption, the basis of PO, and atherosclerosis (AE). We hypothesized that dyslipidemia, an established risk factor for CVD, might influence bone resorption and the development of PO.

Objectives: To evaluate the relationship between the lipid profile (LP) and bone mineral density (BMD) in a cohort of postmenopausal women. Also, an experimental model conditioning a high lipid milieu, as it is that found in apolipoproteinE (apoE)-deficient mice (ApoE -/-), was investigated in relation with bone quality parameters.

Methods: 374 participants were recruited from the Menopause Unit of a tertiary hospital. Women were measured lipids and BMD (DXA) at both lumbar spine (LS) and hip. Further, we investigated the bone response in a pro-atherogenic environment, as conditioned by apoE -/- mice. Female ovariectomized animals were separated into 2 groups that were fed with either standard (SD) or a high-fat diet (HFD). LP and bone microarchitecture (micro-CT) were measured.

Results: Women with PO at LS had significantly lower high-density lipoprotein (HDL) levels than women with normal bone density at this site. In regression models the relationship between HDL and BMD remained significant at LS. HFD fed mice had a significant increase of total cholesterol (TC) and low-density lipoprotein (LDL) compared to those with SD. HDL remained similar in both groups. Bone microarchitecture measurements did not significantly differ between groups.

Conclusion: A positive relationship was detected between HDL levels and LS BMD in the human. Extremely high levels of TC and LDL did not alter bone micro-architectural parameters when HDL levels were unaltered. The relationship between HDL and bone metabolism requires further study.