Petunidin, one of the major anthocyanins which possess potent antioxidative activity, prevents bone loss in sRANKL-induced osteopenic mice.

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Osteoporosis characterized by a decrease in bone mass, is thought to be one of the chronic and lifestyle-related diseases. We aimed to elucidate the bone protective effects of petunidin, considering its potent antioxidative activity. Seven-week-old female C57BL/6J mice were divided into three groups: control, sRANKL-induced osteopenic mice (vehicle) and 7.5 mg/kg/day petunidin-treated osteopenic mice (petunidin). Bone morphometric parameters and microarchitectural properties of the femur were determined using a micro-CT system. The vacant area observed in the marrow cavity of vehicle group reduced in size and filled with trabeculae by petunidin administration. Quantitative analyses showed that petunidin significantly increased BV/TV, Tb.Th, Tb.N, reflecting the increase in trabecular bone mass. Furthermore, bone histomorphometry analyses showed that petunidin administration significantly increased OV/TV, O.Th, OS/BS, Ob.S/BS and N.Ob/BS, suggesting that bone formation was accelerated by petunidin. In contrast, major resorption-parameters (ES/BS, Oc.S/BS and N. c/BS) were decreased in the petunidin-treated group. Histological sections of the distal femurs demonstrated that both of osteoid thickness and height of the osteoblasts were increased by petunidin administration. In conclusion, the present study showed that oral administration of petunidin improved sRANKL-induced osteopenia in mice through increased osteoid formation, reflecting accelerated osteoblastogenesis, concomitant with suppressed bone resorption.