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Alpha-lipoic acid produces bone-protective effects via modulating Nox4/ROS/NF-κB and Wnt/Lrp5/β-catenin signaling pathways in H₂O₂-treated MC3T3-E1 cells and ovariectomy rats

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Recently, increasing studies proved the relationship between oxidative stress and osteoporosis. And some studies have been done to detect the possible beneficial effects of Alpha-lipoic acid (ALA), a potent antioxidant, on osteoporosis *in vivo* and *in vitro*. However, the detailed mechanism(s) underlying the bone-protective action of ALA are still poorly understood. The present study aims to examine the mechanisms by which ALA produces bone-protective effects *in vitro* and *in vivo* on base of its antioxidant effects, thus the effects of ALA on H₂O₂-treated MC3T3-E1 pre-osteoblasts and ovariectomized osteoporosis rat model were investigated by using bone biomechanical testing, micro computed tomography, western blotting and qRT-PCR analysis. The results showed that ALA promoted osteoblastic formation, inhibited osteoblastic apoptosis, increased OPG/RANKL ratio and enhanced bone formation *in vitro* and prevented bone loss *in vivo*. And the effects of ALA were via modulating Nox4/ROS/NF-κB and Wnt/Lrp5/β-catenin signaling pathways. The current study indicated that ALA might be beneficial for the prevention and therapy of osteoporosis clinically at the end of advanced studies.

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