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A biochemical and histomorphometric study of the potential anabolic and antiresorptive effects of methionine amino acid on ovariectomy induced osteoporosis in rats

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Osteoporosis is a growing public health problem in both developed and developing countries, particularly among postmenopausal women. The seriousness of the disease comes from the increased risk of fracture, increasing with age. Most of established osteoporosis pharmacological treatments are associated with risky side effects, for example ulcer and renal toxicity with bisphosphonates, and cardiovascular complications with hormone replacement therapy. Therefore, development of safer prophylactic and treatment strategies is needed. This study aims at assessing the effect of methionine on ovariectomized rat model of postmenopausal osteoporosis. Female albino rats were divided into four groups: (I) sham rats (normal control), (II) ovariectomized (osteoporosis control), (III) ovariectomized + alendronate 0.1 mg/kg orally daily for 8 weeks, (IV) ovariectomized + methionine 250 mg/kg orally daily for 8 weeks. Serum osteocalcin and tartrate-resistant acid phosphatase 5b (TRAP5b) were determined. Histomorphometric measurement of trabecular and cortical bone thickness was done and analyzed. Treatment of ovariectomized rats with methionine produced both anabolic and antiresorptive effects on bone. The anabolic effect was evidenced by histological signs of bone formation and histomorphometric analysis revealing increased bone thickness compared to group II and III. The significantly lower serum TRAP5b compared to group II and histomorphometric analysis evidenced the antiresorptive effect. The results of our study suggested potential anabolic and antiresorptive effects of methionine in postmenopausal osteopororsis. However, further studies on the efficacy as well as safety of methionine treatment in postmenopausal osteopororsis in human and comparing it with the only approved, until now, bone anabolic drug, teriparatide, is recommended.

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Quasi-conformal statistical shape analysis of hippocampal surfaces for Alzheimer's disease analysis

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Alzheimer's Disease (AD) is a no-cure disease that has been creating troubles to scientists for many years. Analyzing the disease has become an important but challenging research topic. The shape analysis of the sub-cortical structure of AD patients has been commonly used to understand this disease. In this paper, we assess the feasibility of using shape information on the hippocampal (HP) surfaces to detect some sub-structural changes in AD patients. We propose a quasi-conformal statistical shape analysis model, which allows us to study local regional geometric changes of the HPs amongst normal control (NC) and AD groups. A shape index defined by the quasi-conformality and surface curvatures is used to characterize region-specific shape variations of the HP surfaces. Feature vectors can be extracted for each HPs, with which a classification model can be built using machine learning methods to classify HPs into NC and AD subjects. Experiments have been carried out on 99 normal controls and 41 patients with AD. Results demonstrate the proposed quasi-conformal based model is effective for classifying HPs into NC and AD groups with high classification accuracy (with highest overall classification accuracy reaches up to 87.86% in a leave-one-out experiment).

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