Combination Drug Therapy for the Treatment of Osteoporosis

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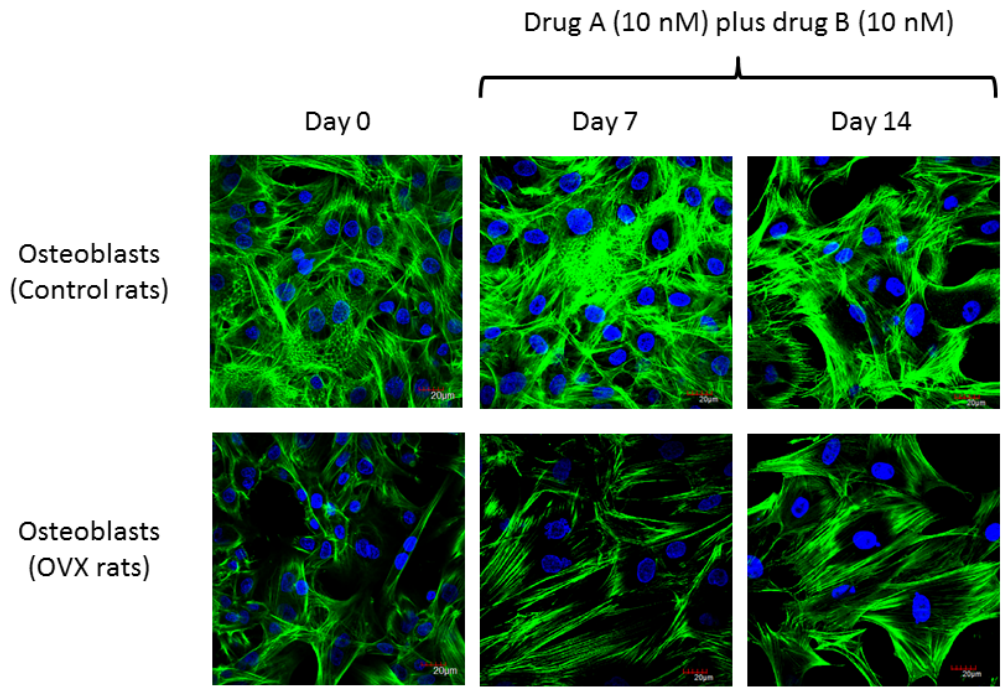
Technology description

Osteoporosis, a silent disease, is a skeletal disorder characterized by compromised bone strength predisposing to an increased risk of fractures. The global burden of osteoporosis is significant nowadays – over 200 million people worldwide and approximately 30% of all postmenopausal women in the USA and Europe are affected by this disease. Osteoporosis occurs in both men and women because of aging and post-menopause. With an increase in life expectancy of the general population, it is anticipated that number of patients with this disease will be escalated within this decade and beyond. Despite recent successes with drugs that inhibit bone resorption, there is a clear need for anabolic agents that can substantially increase bone formation in patients who have already suffered substantial bone loss. Current therapeutic strategies such as hormone replacement therapy and bisphosphonates are effective but they are associated with serious side effects particularly after long-term uses. In contrast to monotherapy, combination drug therapy utilizes more than one medication with which individual agent is given at the lowest possible therapeutic dosage (i.e. minimal side effects are anticipated) and with additive/synergistic therapeutic outcomes resulted. In this project, the bone anabolic properties of two therapeutic agents, administered in combination (which has not been done and proposed before), have been determined by evaluating the levels of bone formation biomarkers, e.g. alkaline phosphatase (ALP), bone morphogenetic protein-2 (BMP-2) and osteocalcin (OCN), Alizarin red (for mineralized extracellular matrix) and a novel protein (which is important in altering cellular Ca2+ levels) which we recently discovered in bone cells of rats (normal and ovariectomised rats). Similar to other diseases (e.g. AIDS, peptic ulcer) using similar treatment regime, combination drug therapy in our study has provided desirable additive bone anabolic effects, ex vivo, in bone cells of ovariectomized rats (an animal model for human estrogen-deficiency / post-menopausal associated osteoporosis).



Effects, *ex vivo*, of drug combination (drug A plus drug B; 7 and 14 days incubation) on F-actin cytoskeleton expression (indicated in green) of osteoblasts (bone-building cells) of control and ovariectomised (OVX) rats (an animal model for post-menopausal osteoporosis research).

Advantages

Our combination drug therapy provides the additive / synergistic bone anabolic effects with the lowest possible therapeutic dosages. No / minimal side effects are anticipated.

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