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Commentary

Molecular Mechanisms of Osteoporosis and its Treatments

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DESCRIPTION

Osteoporosis occurs due to associate imbalance between bone reabsorption and bone formation. As a result, bone breakdown exceeds bone formation. In 1993, WHO outlined osteoporosis as a "progressive skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, with an increase in bone fragility and susceptibility to fracture". Osteoporosis is extremely prevalent disorder estimated to have an effect on two hundred million women and men worldwide, mostly those over the age of sixty years [1]. Osteoporotic fracture may be a major health concern that considerably impacts the quality of lifetime of the affected people. Consistent with the International Osteoporosis Foundation, worldwide, one in 3 women and one in 5 men over the age of fifty years can expertise osteoporotic fractures in their lifetime. On the opposite hand, more than 8.8 million fractures are caused by osteoporosis annually, which suggests that an osteoporotic fracture occur each 3 seconds. 35% of patients' expertise a hip fracture and within the year following the fracture, up to 20% die, mainly due to pre-existent conditions.

Osteoporosis is that the most typical chronic metabolic bone diseases. It's been estimated that quite 10 million individuals within the US and 200 million men and women worldwide have osteoporosis [2]. On condition that the aging population is speedily increasing in several countries, osteoporosis may become a worldwide challenge with an impact on the quality of lifetime of the affected people. Osteoporosis is defined as a condition characterised by low bone density and enhanced risk of fractures due to the deterioration of the bone design. Thus, the foremost goal of treatment is to reduce the risk for fractures. There are many treatment options, mainly medications that may control disease progression in risk groups, like postmenopausal women and older men. Recent studies on the fundamental molecular mechanisms and clinical implications of osteoporosis have known novel therapeutic targets [3]. Rising therapies targeting novel disease mechanisms may offer powerful approaches for osteoporosis management within the future. Here, we have a tendency to review the etiology of osteoporosis and also the molecular mechanism of bone transforming, present current pharmacological options, and discuss rising therapies targeting novel mechanisms, investigational treatments, and new promising therapeutic approaches.

Given that life expectancy is increasing globally, osteoporosis will affect the quality of life of people and impose an economic burden in most countries. Therefore, osteoporosis should be properly managed using effective approaches, and this may be achieved by understanding the mechanisms underlying the pathologic process of this disease [4]. To date, bisphosphonates (BPs), that inhibit bone reabsorption, are one among the foremost common medications for the treatment of osteoporosis.

Osteoporosis is outlined as a Bone Mineral Density (BMD) T score of -2.5 or less, consistent with the diagnostic criteria created by UN agency using deviation scores of BMD related to peak bone mass in healthy young women. BMD T scores between −1 and −2.5 are thought of osteopenia and low bone mass. However, BMD is barely one among the risk factors for fracture, and also the majority of fragility fractures occur in people with BMD T values higher than the −2.5 threshold, suggesting that BMD may be a restricted indicator of osteoporosis within the clinic. Deterioration of bone design will increase the chance of fracture. Osteoporotic fractures are the primary cause of bone-associated morbidities and result in a 2-8 fold enhanced risk of mortality. As an example, an 8%-36% increased mortality risk was found within one year after a hip fracture. Fractures within the population affected with osteoporosis determine the quality of life, as they cause pain, impaired mobility, substantially reduce pulmonary function, have an effect on the chance of infection, result in changes in body image, psychosocial distress, social isolation, loss of independence, and determine life expectancy. Thus, drug discovery efforts aim to reduce the fracture rate and increase BMD.

Osteoporosis is an increasingly prevalent condition because the aging population grows quick globally. It causes quite 8.9 million fractures annually worldwide [5]. Not only in western countries, but also in East Asian countries, like China, Korea, and Japan, several older women and men have already got enhanced osteoporotic fracture risks. Osteoporotic fractures could result in significant functional limitations and increased mortality. Thus,

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timely diagnoses, prescription of medication as well as the management of this disease are vital.

To date, BPs stay the first-line and most cost-effective medication for osteoporosis, however there are also concern regarding their long-term use due to safety issues. As mentioned above, the primary goal of osteoporosis treatment using prescribed drugs is to reduce the risk for fracture. To attain this, adequate investigations should be conducted and a proper diagnosis should be given. Since BMD alone cannot predict the risk for fracture, new cutting-edge technologies, as well as next-generation sequencing, genome-wide screening and assessment, and somatic cell therapeutics should be considered. Lastly, by gaining a higher understanding of the molecular mechanisms underlying osteoporosis, enabling and using new emerging technologies, it's possible to achieve outcomes in patients with osteoporosis.

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