Alternative indication for clinically-approved drug to treat osteoporosis and low bone mass

Technology #cu16165

This technology is a treatment for osteoporosis that improves bone formation by targeting primary cilia and cellular mechanotransduction using an existing FDA-approved therapeutic.

Unmet Need: Therapeutics for enhancement of new bone formation

Current treatments for osteoporosis are unable to stimulate new bone formation and primarily rely on inhibition of bone resorption, which can lead to atypical fracture and necrosis. Mechanical stimulation is critical to normal bone maintenance, and is a potent anabolic stimulus of bone formation. However, current therapies for osteoporosis and other conditions of low bone mass fail to leverage the inherent mechanosensitivity and regenerative potential of bone. The development of methods to enhance natural bone formation in response to mechanical stimulation therefore hold significant promise for treatment and even reversal of osteoporosis.

The Technology: Clinically approved drug targets primary cilia-mediated mechanotransduction to promote bone formation

This technology describes a method that uses existing FDA-approved therapeutics to sensitize bone to mechanical stimulation in order to enhance bone adaptation. Primary cilia, which are subcellular organelles, have been identified as key osteocyte mechanosensors, directing signaling to osteoblasts to initiate the formation of new bone. This technology demonstrates that the clinically approved drug fenoldopam targets primary cilia to enhance cell mechanosensitivity and lead to new bone formation. As fenoldopam and other drugs with the same mechanism of action are already FDA-approved, this technology has the potential to reduce clinical trial costs, as non-toxicity in humans has already been demonstrated. As such, the technology presents a potential therapeutic approach to reverse the damaging effects of osteoporosis using a pharmaceutical currently approved for other indications.

This technology has been efficacious in vitro and preliminary in vivo mouse studies have demonstrated that fenoldopam treatment increased bone formation following mechanical stimulation.
Applications:

- Therapeutics for osteoporosis and low bone mass
- Drug screening for new, primary cilia-targeted, osteoporosis therapeutics
- Therapeutics for other mechanosensitive systems with ciliopathies (kidney disease, Bardet-Biedl Syndrome, certain cancers)
- Therapies to reduce fracture risk in patients with abnormally high bone density

Advantages:

- Already clinically-approved can reduce cost of clinical trials
- Application in many different conditions with ciliopathies (bones, kidneys, cancers)
- No off-target impairment of normal bone formation and resorption

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Patent Information:

Patent Pending

Related Publications:


Tech Ventures Reference:

- IR CU16165
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