



Small chemical NMP for the prevention and treatment of bone loss

Background

Bone degeneration is a common feature of cancer metastasizing into bone and the reason for osteoporosis. Due to an aging society osteoporosis or other bone destructive disorders are a major problem in our health system. Currently used therapies are associated with adverse effects, including osteonecrosis of the jaw, hypercalcemia, and hypertension.

New Findings

The surprising finding was made that N-methyl-2-pyrrolidone (NMP) is able to inhibit osteoclastogenesis, a process which is needed for bone degradation. NMP may be applied e.g. in a bone cement, filler or bone substitute material.

The present invention is based on studies to reveal the effect of pyrrolidones, especially NMP on bone cells. When the effect of NMP on osteoclasts or a model cell line for osteoclasts (RAW264.7 cells) was determined it was surprisingly found that NMP is able to inhibit osteoclastogenesis, the differentiation to osteoclasts, which is needed for bone degradation.

The effect of NMP on the ability of mature osteoclasts to resorb bone was evaluated in RAW 264.7 cells plated on bone slices and stimulated with RANKL. Cells stimulated with RANKL formed resorption pits. Additional treatment with 5 mM NMP significantly reduced the formation of resorption pits in number and in overall area. It was found that NMP suppresses c-Fos and NFATc1 expression, which are important downstream regulators of osteoclast differentiation. Thus, NMP inhibits osteoclast differentiation by modulating various signalling molecules independent of the BMP signalling pathway.

Patent Status and Contact

A patent application covering the invention has been filed. We are looking for an industrial partner to exploit the commercial potential of the invention.

Contact: Unitectra, Technology Transfer Office University of Zurich
 Mr. Adrian Sigrist, Ref. UZ-12/400
 Möhrlistrasse 23, CH-8006 Zürich (Switzerland)
 Tel. ++41-44-634 44 01, Fax ++41-44-634 44 09
 Email: mail@unitectra.ch, Web: www.unitectra.ch