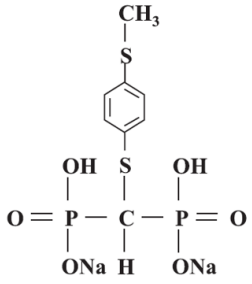
Tohoku Univ. Technology

Cartilage Proliferation Inducer

Cartilage Growth × Anti-inflammation × Antioxidation: A New Approach to Preventing and Treating Joint Diseases



MPMBP

Advantages of MPMBP:
・Nitrogen-free BP; bisphosphonate-related osteonecrosis of the jaw (BRONJ) is unlikely
・Promotes bone and cartilage growth
・Inhibits bone resorption
・Suppresses inflammation
・ Antioxidant effect

Overview

Cartilage loss from aging-related joint degeneration or from diseases such as temporomandibular disorder (TMD) is currently treated with anti-inflammatory drugs or artificial joint replacement, but neither can restore cartilage tissue that has already been lost. This invention relates to the chondrogenesis-promoting effect of MPMBP, a type of bisphosphonate (BP).

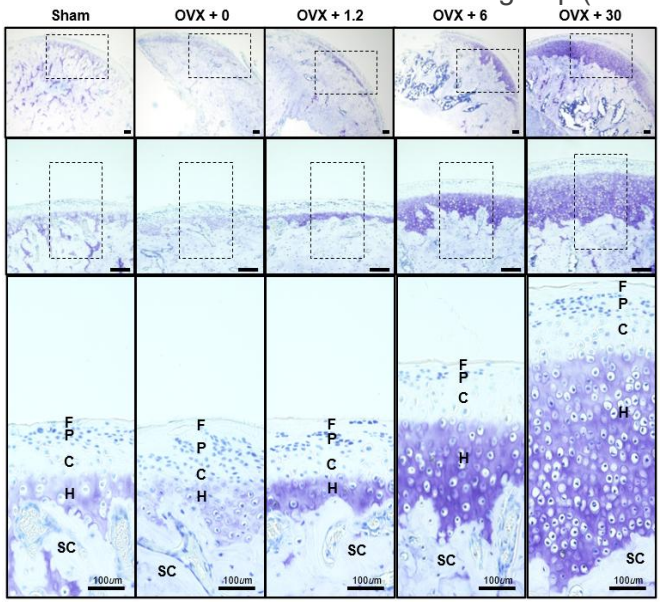
As shown in the figure on the right, toluidine blue staining of the mandibular condyle of ovariectomized (OVX) rats, a model of estrogen-deficiency osteoporosis, showed that MPMBP administration increased the thickness of the cartilage layer (chondrocyte + hypertrophic chondrocyte layers) reduced by OVX. The newly formed cartilage was rich in proteoglycan, restoring the proteoglycan content lowered by osteoporosis to normal levels. The number of osteoclasts in the subchondral bone layer was also decreased (data not shown).

Potential Applications

- Pharmaceuticals: preventive/therapeutic agent for cartilage loss in osteoarthritis
- Orthopedics: cartilage-proliferating agent after joint surgery
- Dentistry / oral surgery: restoration of TMJ cartilage in TMD

Administration of MPMBP increased cartilage layer thickness

Control MPMBP-treated group (1.2–30 mg/kg/week)



F: Fibrous layer
P: Proliferative cell layer
C: Chondrocyte layer
H: Hypertrophic chondrocyte layer
SC: Subchondral bone layer

In model rats, once-weekly administration of MPMBP for 12 months confirmed cartilage proliferation.

IP Data

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Inventor : CHIBA Mirei, TAKAHASHI Tetsu, MIZOGUCHI Itaru, SHINODA Hisashi
Admin No.: T20-1259

Contact

Tohoku Techno Arch Co., Ltd.
Please visit CONTACT here