Osteoporosis Developed Articular Cartilage Degeneration by Subchondral Bone loss

INTRODUCTION: The relationship between Osteoarthritis (OA) and Osteoporosis (OP) remains unclear. The purpose of this study was to examine whether bone mineral density loss influenced articular cartilage degeneration using ovariectomized mice and post-traumatic osteoarthritis mice.

METHODS: Bilateral ovariectomy (OVX) and sham surgery were performed on 18 mice. Two weeks after surgery, knee ligaments of right knee were transected (OP and/or PTOA model). Treatment with alendronate (ALN) was given weekly administration of ALN and 5 mice were given saline. All mice were sacrificed at 8 weeks and were scanned on a micro-computed tomography (µCT). Specimens were evaluated using the Mankin scoring system.

RESULT: µCT analysis of the distal femoral metaphysis showed that bone volume/tissue volume (BV/TV) were significantly less in the OP and OP+PTOA than control. The femoral distal subchondral bone showed that BV/TV were significantly less in the OP and OP+PTOA than control. In the Mankin scoring system, average histological scores were significantly higher in the OP than control, and also higher in the OP+PTOA than the PTOA. At the treatment with ALN, BV/TV and histological scores were significantly better in ALN(+) than ALN(-). DISCUSSION: These result suggested that subchondral bone might play an important role in the progression of cartilage degeneration, and improving the condition of subchondral bone prevented the development of OA. Alendronate administration could prevent the development of post-traumatic OA with osteoporosis.

Key words: Osteoarthritis, Osteoporosis, Articular Cartilage