INTRODUCTION:
In many clinical conditions the optimal solution to restore the spine’s integrity is through surgical intervention. Posterior or anterior interbody fusion have been developed and employed to address these concerns. The biology of bone incorporation in various mechanical spacers is an inherent limitation. The biological cages have been developed that permit restoration of the anterior column with a machined allograft bone.

In many clinical studies of biological cage, the long-term result of patients was satisfactory. There’s no infectious complications, extrusion, fracture, loss of height, or resorption of the graft and pain. But for the 100% bone fusion, it is a shortcoming to take a long time period after surgery. That’s why the biological cage is made of the cortical bone which has only osteoconductivity. On the other hand, Demineralized bone matrix is made by acid soaking processing. Through this process, The DBM can expose and activate collagen, BMPs and other growth factors. Though there’re various types of DBM products for bone defect situations, DBM is not suitable to support the mechanical strength.

If we can control conditional demineralization process, the cortical bone may be the optimized osteoinductive and osteoconductive bone structure. This study aims to identify the efficiency of biomechanical and bioactive properties of the bovine cortical bone cage treated with conditionally surface demineralization.

METHODS:
The procured bovine femoral bones were got rid of lipid, protein, and blood materials by 3% hydrogen peroxide and 70% ethanol. The distilled water cleaned bones were cut by band saw. Several bone cages of size 10(L) x 25(W) x 7(H) mm were produced by milling machined process.

The cortical bone cages were demineralized by 0.6N HCl treatment by various conditions, which were the tendency of HCl treatment time, position, direction. After neutralization with pH 7.0, phosphate buffered saline washing and then, freeze drying process, the vial vacuum packed bone cages were sterilized by 25kGy gamma irradiation for final sterilization.

For analysis of morphology and structure, we used scanning electron microscope (SEM), and optic microscopy. And EDS system was proceeded for Ca content in various layers of bone cage. In vitro test for cell viability and differentiation, extracted supernatant from each bone cage by tissue culture was treated in MC3T3E1 cells.

For indentifying releasing materials, the others were carried for quantitative analysis by ELISA. After each conditioned period, mRNA expression was compared by RT-PCR. The axial compression and bending strength were measured by universal testing machine (UTM) for biomechanical property.

RESULTS:
The mineralized cortical bone cage-normal bone cage was used for control. The size of all the cages was 10(L) x 25(W) x 7(H) mm (Fig.1).

The surface of normal bone cage and conditionally demineralized bone cage was observed by SEM (X1000). The surface of demineralized bone cage was changed in flexible and fibrous condition as compared with control (Fig.2).

DISCUSSION:
Conditionally surface demineralized bone cage has good osteoconductivity and osteoinductivity properties of bone formation. If this technique is applied to bone cage for spine surgery, it will be effective in spinal interbody fusion. Although this study is very simple design, small changes increased the quality of biological bone cage. In further study, we’ll confirm in vivo test and design more anatomic structural bone cage.