Experimental glucocorticoid-induced bone loss in mice is strongly influenced by the strain

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INTRODUCTION
Glucocorticoids (GC) are often used as anti-inflammatory agents in the treatment of inflammatory disorders. However, long term use of GC in all chronic inflammatory diseases may produce unwanted secondary side effects such as GC induced osteoporosis (GIO). Experimental models of GIO are well established in the Swiss and CD1 mice, nonetheless most genetically modified mice are on C57BL/6 background.

The aim of this study was to investigate the effect of long term GC administration on bone turnover in two frequently used mouse strains; C57BL/6 and CD1 in order to assess the influence of genetic background on GIO in these strains.

METHODS
Bone marrow (BM) cells were used to investigate the effect of GCs on osteoclast (OC) in vitro activity.

GIO was induced in 12 weeks old female C57BL/6 and CD1 mice by subcutaneous insertion of long term (60 days) release prednisolone 3.2mg/kg/day or placebo pellets, and bone architecture and biomechanical properties were evaluated.

RESULTS: The GC Dexamethasone promotes osteoclastogenesis in the CD1 mice BM in vitro.
By using BM cells that were induced to form OC, we have found that osteoclastogenesis was stimulated in a dose dependent manner by CO in the CD1 mice BM but not in the C57BL/6 mice BM.

RESULTS: Biomechanical properties of femur are reduced in GC treated CD1 mice but not in C57BL/6 mice.

RESULTS: Long term in vivo Prednisolone administration induced osteoporosis in CD1 mice but not in C57BL/6 mice.
Micro-CT analysis of lumbar vertebrae revealed that long term GC administration reduced trabecular bone volume and trabecular number, while the structural model index was increased in CD1 mice as reported previously in GIO. Bone morphometric parameters did not change in GC receiving or control C57BL/6 mice.

CONCLUSIONS
Dexamethasone increased significantly the osteoclastogenic potential of CD1 mice BM in vitro while the C57BL/6 mice BM was not affected.
Long term GC administration in vivo reduced maximum load and femoral elasticity, vertebral bone volume and trabecular number in CD1 mice while the biomechanical properties and bone indices were not affected in C57BL/6 mice.
Prednisolone stimulated in vivo osteoclastogenesis in the CD1 mouse but not in C57BL/6 mice.
Long term GC administration produced strain dependent differences; inducing GIO in CD1 mice while the C57BL6 mice appeared to be protected against GIO.

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