Effect of Static Magnetic Field on MC3T3-E1 Cells Differentiation via TGF-β Pathway.

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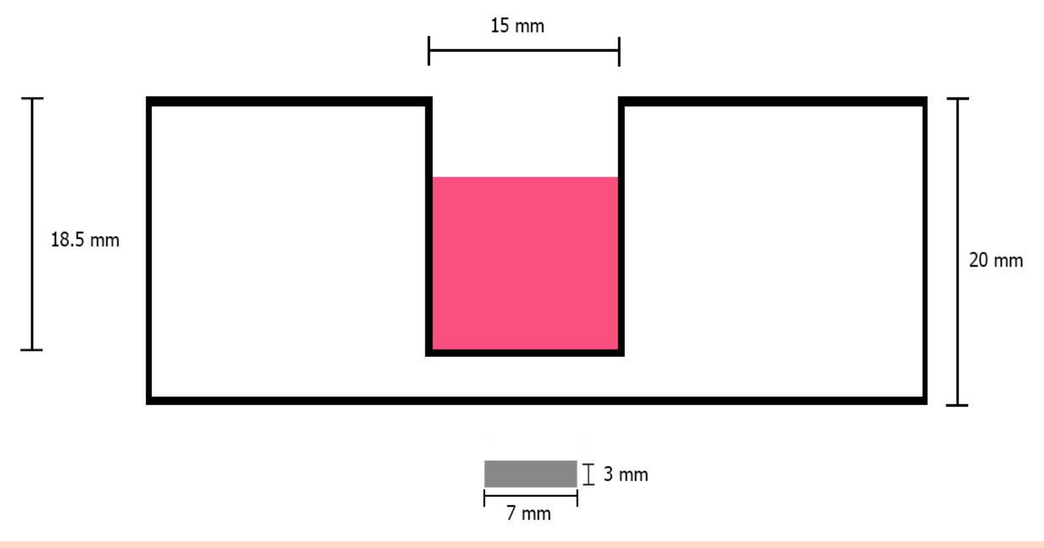
Background and purpose

- Static magnetic force is proved to be a safe way to achieve better ossification. However, the mechanism of using magnets are still unclear in cellular level. The purpose of this study was to evaluate the relevance of ossification by magnetic stimuli via TGF-β pathways.

Material and methods

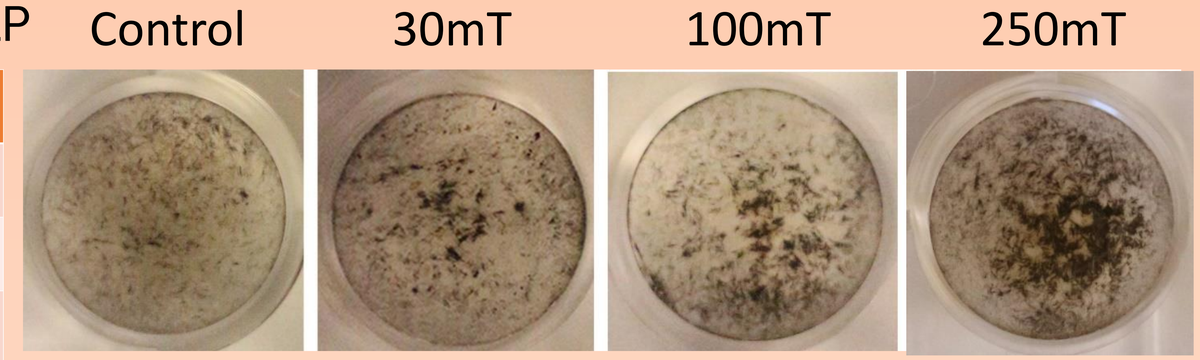


Cell : MC3T3-E1
Medium : 10% FBS, MEM, 10 nM β-glycerol phosphate, 50 μg/mL ascorbic acid, and Dexamethasone
Magnet : Neodymium 3x7 mm
Measuring : ALP, total protein, cell's viability, Qt-PCR and Von-Kossa staining

Result

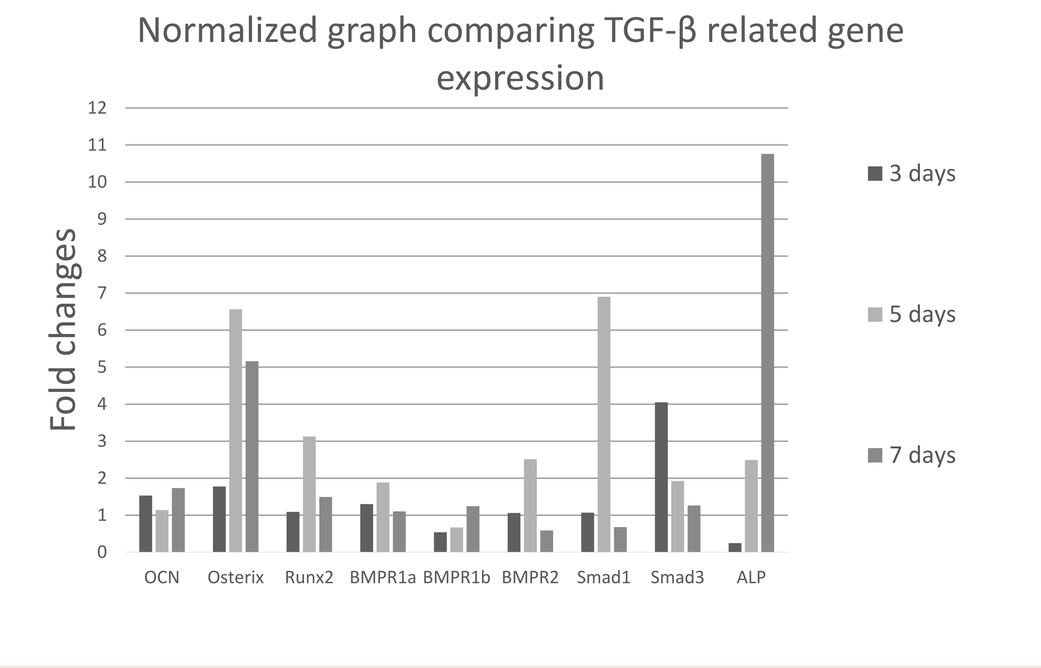
- Finding the best magnetic force by measuring ALP

SMF	CNT	EXP	T-test
30mT	0.69	0.73	0.563
100mT	1.21	1.06	0.199
250mT	0.70	1.07	0.008



250mT group shows higher ALP with statistic significant($P \leq 0.05$). Confirmed with Von-Kossa staining.

Result



- qRT-PCR result comparing osteogenic marker of 250mT group comparing with GADPH house keeping gene

Conclusion

- Recently static magnetic field are one of the interested choices to get faster ossification with a safe procedure. This study can confirm that there was no cellular level toxicity from static magnetic field at proper intensity. Moreover, static magnetic field provide faster proliferation rate and higher ossification rate for MC3T3-E1 cell.