# Effects of static magnetic field on the early differentiation stage of osteoblast.

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## Abstract

Cell culture studies have shown that static magnetic fields induce osteoblastic differentiation at an early stage. However, the mechanisms of differentiated effects have not been well described. We postulated that static magnetic fields stimulate osteoblastic differentiation by regulating early local factors released by the cells. To examine our hypothesis, MG63 osteoblast-like cells were exposed continuously to 0.4-T static magnetic fields for 12, 24, 48, and 72 hours. The morphologic changes and matrix vesicles release were observed by scanning and transmission electron microscopy. The effects of static magnetic fields on levels of transforming growth factor-beta1, Type I collagen, osteopontin, and alkaline phosphatase were compared between the exposed and unexposed cells. The data suggest MG63 cells treated with static magnetic fields have more differentiated morphologic features. The local regulatory factors produced by static magnetic field-treated cells were greater than those of the control cultures. These findings provide evidence that static magnetic fields affect osteoblastic maturation by up-regulating early local factors.