Antibacterial MgO Nanomaterials to Enhance Orthopedic Tissue Integration*

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Magnesium in the body regulates nucleic acid chemistry, mediates cell-cell and cell-extracellular matrix (ECM) interactions via integrin activation, and directly influences mineral formation and resorption in bone. Importantly, magnesium oxide (MgO) nanoparticles also exhibit powerful antibacterial properties. Here, MgO nanoparticles were dispersed within poly-L-lactic acid (PLLA) composites and tested for their mechanical properties, surface roughness, antibacterial potential, and their ability to support the growth of bone and ligament tissues *in vitro*. Results indicated enhanced adhesion and proliferation of both osteoblasts and fibroblasts in the presence of MgO nanoparticles, and PLLA-MgO-hydroxyapatite (HA) nanocomposites showed optimal properties for bone tissue engineering applications. Thus, the MgO nanomaterials investigated here should be further investigated to improve orthopedic tissue integration with reduced antibiotics usage.

(*) This work was supervised by Professor Thomas J. Webster, Department of Chemical Engineering, Northeastern University.