

# **Regulation of Inflammation in Epithelial Cells by *Lactobacillus* Oligodeoxynucleotides and Development to Novel Transdermal Oligodeoxynucleotide Materials**

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Research into the action of probiotics against infectious and inflammatory diseases and allergies has recently attracted considerable attention in both the medical and food sciences. My research group has identified immunomodulatory DNA sequences from immunoregulatory probiotics (immunobiotics) and confirmed that several synthetic oligodeoxynucleotides (ODNs) derived from these sequences maintain the immunomodulatory properties. To develop ODNs that retain functionality after oral administration, my research group attempted to produce acid-resistant ODN particles by encapsulating ODNs in carbonate apatite particles (ODNcaps) using a cell transfection method with carbonate apatite particles. These edible ODNs retained their immunomodulatory activity when taken up by intestinal mucosal cells. We have also developed ODN particles for transdermal absorption. The ability to produce particles containing immunomodulatory ODNs opens the possibility of using ODN particles in studies involving mouse disease models. If the therapeutic efficacy of ODN particles can be achieved without parenteral injection, the cost, complexity and inconvenience of immunomodulatory therapy could be dramatically reduced. In addition, this approach may lead to the development of novel immunobiotic foods and cosmetics that will contribute to the prevention or suppression of many types of infectious, allergic, inflammatory, and autoimmune diseases.