Exploring the Therapeutic Potential of Salmon Egg and Plant Callus-Derived Polydeoxyribonucleotide (PDRN) for Wound Healing and Tissue Regeneration

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Polydeoxyribonucleotide (PDRN) is a mixture of polynucleotides primarily extracted from the sperm cells and eggs of chum salmon or salmon trout for clinical and therapeutic applications. It activates the adenosine A2A receptor and exhibits several pharmacological properties, including promoting wound healing, angiogenesis, anti-inflammatory, anti-apoptotic, and tissue repair. Although PDRN is already used for clinical and cosmetic purposes, additional research is needed to further characterize its bioactivities and applications. The aim of this study was to evaluate the application of PDRN derived from salmon eggs and cultured plant tissues. We investigated the degradability of salmon eggs PDRN-coated bioresorbable sutures and the histological changes that occur in response to implantation with the suture. After implantation of threads coated with salmon eggs-derived PDRN, there were no significant signs of inflammation in the thread-loaded regions of rat skin during the experimental period. As the duration of the thread transplantation period increased, the thread remaining at the experimental site gradually became transparent and fragmented. There were no significant differences in tensile strength between non-coated and PDRN-coated threads throughout the loading period. The fibrous bridging effect was evident near the thread insertion site, and newly formed dense collagen fibers stained were observed near the PDRN-coated thread insertion site. Furthermore, there was an increase in the expression of genes related to collagen synthesis. In addition, salmon-derived PDRN induced the proliferation of human skin fibroblast cells (CCD-986sk) and stimulated MAPK signaling proteins. We also cultured Brassica oleracea var. plants. Various plant tissues (such as *Brassica oleracea var. italica*) were cultured, and PDRN was extracted from stable callus. We investigated the potential of plant callus-derived PDRN to substitute animal-derived PDRN. The plant callus-derived PDRN did not induce cell cytotoxicity and reduced inflammatory responses in lipopolysaccharide (LPS)-induced Raw 264.7 cells. These results suggest the possibility that PDRN derived from eggs and plants can be utilized in clinical and pharmacological products for wound healing, tissue regeneration post-surgery, and repair.