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Salmon nasal cartilage-derived Proteoglycans as a novel treatment for osteoarthritis

Osteoarthritis affects 595 million people worldwide, with prevalence increasing sharply with age to 38% in those 70 and older. Current treatments have significant limitations as NSAIDs pose gastrointestinal, cardiovascular, and renal risks unsuitable for long-term use, while glucosamine and chondroitin show inconsistent clinical benefits. This study evaluated salmon nasal cartilage-derived proteoglycans as a novel multi-modal treatment for osteoarthritis. Male Sprague-Dawley rats with monosodium iodoacetate-induced osteoarthritis received oral proteoglycans at doses of 2.1, 4.2, or 8.4 mg/kg/day for 31 days. The marine-derived macromolecules contain 40-60% proteoglycan content and structurally resemble human aggrecan. Assessments included functional tests, structural evaluations, biochemical markers, and molecular analyses. Results demonstrated therapeutic effects comparable to ibuprofen, with treatment improving mobility, preserving cartilage matrix, maintaining chondrocyte viability, and reducing inflammation through three integrated mechanisms. Anti-inflammatory effects included lowering PGE2, nitric oxide, TNF-α, IL-1β, IL-6, COX-2, and iNOS. Matrix protection involved reducing MMP-3/MMP-9, increasing TIMP-1/TIMP-3, and enhancing aggrecan and collagen II synthesis. Cell preservation decreased apoptosis markers while increasing Bcl-2 expression. Bone mineral density significantly improved from 236.10±29.57 in controls to 286.63±8.14 in treated rats. This marine-derived approach addresses multiple osteoarthritis pathologies simultaneously while maintaining favorable safety profiles for long-term use. Successful Japanese commercialization provides regulatory precedent, with ongoing US development including GRAS designation and planned clinical trials, positioning salmon nasal cartilage-derived proteoglycans as a promising therapeutic alternative for elderly patients who cannot tolerate current treatments.

Keywords: Osteoarthritis, Marine-derived proteoglycans, Bioactive peptides, Chondroprotective therapy, Anti-inflammatory effects, Preclinical study

Biography

Pabel Delgado is Group Executive for Nippon Pharmaceutical, advancing cross-border innovation aligned with the company's mission in ageing and regenerative health. He is a US-Japan biopharma professional and founder of the company's affiliated Asterism Healthcare Group—comprising Sumo Nutrients, Asterism Healthcare, and Heritage Laboratories—developing solutions in functional ingredients and nutritional therapeutics. His background spans stem cell research at leading institutions and pharmaceutical strategy roles at Alfresa Pharma and Shionogi. A clinical professor of social entrepreneurship, he has taught at Catawba College and Wheaton College Massachusetts, integrating biotechnology and social impact. Delgado also founded the Sector Six (S6IX) International Accelerator in Japan.

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