

OCEANS

in MEDICINE

*Advances in Marine-Based Therapeutants
for Modern Diseases*



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Oceans in Medicine: Advances in Marine-Based Therapeutants for Modern Diseases

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Chapter 8: Marine Collagen Peptides: Regenerative Approaches in Wound Healing, Skin Aging, and Osteoarthritis

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Abstract

Marine collagen peptides have emerged as promising bioactive compounds in regenerative medicine due to their high biocompatibility, bioavailability, and multifunctional biological activities. Derived primarily from marine by-products such as fish skin, scales, bones, and invertebrates, these peptides offer a sustainable and safe alternative to mammalian collagen sources. This chapter provides a comprehensive overview of marine collagen peptides with a focus on their regenerative applications in wound healing, skin aging, and osteoarthritis. The structural characteristics, extraction methods, and biological properties of marine collagen peptides are discussed in relation to their antioxidant, anti-inflammatory, and immunomodulatory effects. Particular emphasis is placed on their role in accelerating wound repair through enhanced fibroblast proliferation, angiogenesis, and extracellular matrix remodeling. Additionally, the anti-aging potential of marine collagen peptides in improving skin elasticity, hydration, and dermal collagen synthesis is critically evaluated. Their therapeutic relevance in osteoarthritis is also examined, highlighting chondroprotective mechanisms, cartilage regeneration, and symptomatic relief. Safety, bioavailability, and regulatory considerations are addressed, along with current challenges and future prospects. Overall, marine collagen peptides represent a versatile and innovative biomaterial with significant potential for regenerative and therapeutic applications.

Keywords

Marine collagen peptides; Regenerative medicine; Wound healing; Skin aging; Osteoarthritis; Biomaterials; Tissue regeneration

1. Introduction

Collagen is the most abundant structural protein in the extracellular matrix (ECM) of connective tissues, where it plays a fundamental role in maintaining tissue integrity, mechanical strength, and cellular signaling. It constitutes a major component of skin, cartilage, bone, tendons, and ligaments, and is therefore central to tissue repair and regeneration processes. In regenerative medicine, collagen-based biomaterials have long been