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Hybrid Fusion Protein as a Dual Protease Inhibitor for the Healing of Chronic Wounds

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Abstract

Diseases bring about the need for interventions that pinpoint each specific aspect of the illness. Commonly, remission of a complex disease is accomplished by mixing treatments, medications, and therapeutics together in a fashion where they may interact with each other negatively as a systemic heterogeneous mixture. For example, chronic wounds are very localized and have their own complex environment where tissue deconstruction due to high levels of multiple proteases, such as HNE and MMP-2, outweighs tissue reconstruction. This idea leads to the necessity of a protein that contains low diffusivity rates for localized treatment, strength against high concentrations of proteolytic species that lead to degradation of short chain peptides, while encompassing broad inhibitory effects against multiple proteases. Elastin-Like Peptides (ELP's) are an attractive, thermoresponsive, protein-based drug delivery partner as they contain low diffusivity and serve as a stable architecture for short chain peptide fusion. A novel elastin-like peptide-based protein has been created to target the inhibition of both HNE and MMP-2. As a biologic, this is unique as it is a protein with specific biological activities against multiple proteases, ultimately displaying the potential to mix and match differing biologically active peptides within one amino acid sequence.

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