ANTIOXIDANT AND ANTI-INFLAMMATORY ACTION OF EXOSOMES AND POLYDEOXYRIBONUCLEOTIDES (PDRN) IN REGENERATIVE AESTHETICS: A REVIEW

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INTRODUCTION: Cutaneous aging is a complex physiological process influenced by intrinsic and extrinsic factors, including oxidative stress, chronic inflammation, and a decline in the skin's regenerative capacity. These alterations impair the structure and function of the skin barrier, resulting in visible signs such as wrinkles, sagging, and dryness. In response, there is growing interest in regenerative therapies targeting cellular and molecular repair mechanisms with low toxicity profiles. Among these, exosomes and polydeoxyribonucleotides (PDRN) have gained attention for their ability to modulate inflammation, oxidative stress, and stimulate processes such as cell renewal and extracellular matrix synthesis. However, understanding their safety remains essential for clinical application. OBJECTIVE: To review the literature on the anti-inflammatory, antioxidant, and regenerative potential of exosomes and PDRN, as well as their toxicity profiles. MATERIALS AND METHODS: A literature review was conducted using the PubMed database. The following search terms were applied: "exosomes and tissue regeneration," "exosomes and PDRN in regenerative aesthetics," "PDRN anti-inflammatory and antioxidant action," and "PDRN and exosomes toxicity." RESULTS: Both PDRN and exosomes demonstrated promising effects in tissue regeneration, notably through anti-inflammatory, antioxidant, and wound-healing actions. PDRN primarily activates adenosine A2a receptors, promoting angiogenesis, cell proliferation, and collagen synthesis, with studies reporting an excellent safety profile and no significant adverse effects. Exosomes, particularly those derived from stem cells, modulate the inflammatory response by promoting macrophage polarization and releasing anti-inflammatory cytokines. They also deliver bioactive molecules, such as proteins and nucleic acids, to fibroblasts, keratinocytes, and endothelial cells, directly supporting tissue repair. While exosomes are generally considered safe, their cargo can influence recipient cell behavior and, in some contexts, modulate disease progression or viral susceptibility. CONCLUSION: PDRN and exosomes represent innovative, safe, and effective therapeutic options for skin regeneration. Their anti-inflammatory and antioxidant effects, combined with the ability to modulate the cellular microenvironment and enhance repair processes, position them as promising alternatives to conventional regenerative aesthetic treatments. Further research is needed to confirm their long-term safety and clinical applicability.

Keywords: exosomes, polydeoxyribonucleotide, regeneration, antioxidant, aesthetics.