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Evaluation of heterogenous frozen carboxymethyl cellulose gel loaded mesenchymal stem cells derived microvesicles on critical size defect skin wounds in dogs

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Abstract:

Microvesicles (MVs) derived from mesenchymal stem cells (MSC) play an important biological cell-to-cell horizontal transfer of proteins and RNA, inhibit cellular apoptosis and stimulate tissue proliferation. Fresh MVs are obtained and reused in the same individual and can't be kept for long periods of time. Freezing is a process typically used to preserve perishable materials, or to make viable materials more suitable for transportation and to improve the stability. Sodium carboxymethylcellulose (CMC) has strong ability to absorb and transport fluids and protect wound from bacterial exposure of the external environment. This study aims to develop a readymade functional form of heterogenous MSC-MVs preparations for immediate use and to Evaluate the efficacy of prepared MSC-MVs on wound healing.

Materials and Methods: Three bilateral full-thickness circular wounds of 2 cm diameter were created on the back of three dogs using dermal punch. Wounds were at least 2.5 cm apart. The day on which the wounds were created was designed as day 0. Frozen CMC gel-base was prepared and preserved at -20°C. Twenty-four hours after wound creation, treatment started. Group I (control) received frozen CMC gel alone; Group II (treated) received frozen CMC-MVs gel. Wounds were followed up for 21 days. Systemic antibiotic and pain killers were used for the first 5 days post-wounding.

Results: CMC was proven to be a suitable vehicle for MVs. The frozen CMC-MVs gel had significantly promoted wound healing, collagen synthesis, and neovascularization.

Conclusion: This technique appears to be suitable for treating cutaneous wounds. Preservation of MVs by freezing had proven to conserve the viability, extended the preservation of MVs.

Biography:

Dr Mohamed is a veterinarian, Demonstrator at Department of Surgery faculty of veterinary medicine (Cairo University) interested in stem cell biology fields, regenerative medicine applications, associated biotechnology, and clinical and experimental tissue engineering.

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