Cairo University

Faculty of Veterinary Medicine

Evaluation of Selected Advanced Techniques Used for Management of Skin Wounds in Dogs

A thesis submitted by:

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(Bachelor's degree of Veterinary Science 2016)

Faculty of Veterinary Medicine

Cairo University

For

The Degree of M.V.Sc

Surgery, Anesthesiology and Radiology

Under the Supervision of

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Supervision Sheet

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Abstract

Extracellular vesicles are nanosized vesicles released by different cells and have been separated from most of the body fluids. These vesicles play a central role in cell to cell communication. They serve in regulating normal physiological processes. EVs released from stem cells exert similar therapeutic effect to their originating cells. Fresh stem cells exosomes are usually obtained and re-used in the same individual. Regardless the lengthy preparation time, it cannot be kept viable for long periods of time. So Clinical application of EVs requires the preparation of sufficient and viable active therapeutic-EVs as well as implementing suitable methods for long term preservation to expedite both their clinical and commercial uses. This study defined some methods may be suitable for preservation of therapeutic-EVs as Cryopreservation and drying method (freeze drying & spray drying), discuss the obstacles associated with preservation methods and evaluate the efficacy of cryopreserved EVs using Sodium carboxy-methylcellulose (NA-CMC) as cryoprotectant in treatment skin wound clinically, Histologically and immunohistochemically. Sterile CMC hydrogel was prepared, part of which was loaded with exosomal solution derived from MSCs. The gel was kept at -20°C for

preservation. Two bilateral full-thickness circular skin wounds of 2 cm diameter were created on the back of three experimental dogs. The wounds were at least 2.5 cm apart. Twenty-four hours after wound creation, treatment started. Group I received CMC gel solely; Group II received frozen CMC exosomal gel. The gel was applied 4 times, single application/day, one day interval. the frozen exosomal gel significantly promoted wound healing with no scaring, dermal fibroblasts were enhanced, and organized collagen deposition were seen in the treated group.

CMC proved to be an efficient cryoprotectant and a suitable vehicle for exosomes. Deep freezing was proven to conserve the viability, extended the preservation and facilitated the used of exosomal gel. This technique of preserved cell free therapy is inexpensive, time saving & proficient and seems suitable for treating cutaneous wounds.

Keywords: critical-size-defect, skin-wound, heterogenous, frozen, exosome, carboxymethyl cellulose.

Dedication

To my mother and father for their support and prayers.

To my friends for their patience and help.

To my colleagues who believed in me.

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