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# ASSESSMENT OF SEA BUCKTHORN OIL IN THE MANAGEMENT OF THERMAL BURNS AFTER A PREDETERMINED HISTOLOGICAL SCORE

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**Abstract**: The aim of the present study was to evaluate the efficacy of sea buckthorn oil in thermal burns and their healing process, according to a predetermined histological score. In the experiment, which lasted 14 days, balb/c mice were used, which were induced with cutaneous thermal burns and treated with sea buckthorn oil. For the histological examination, skin samples were collected on the 3rd, 7th and 14th day, which were processed by the hematoxylin-eosin method. The proposed histological score was extremely useful in the comparative establishment of the degree of healing of the epidermis and dermis, thus also quantitatively assessing the efficacy of sea buckthorn oil. The use of sea buckthorn oil in burns accelerates the healing process compared to the control group, which did not receive any treatment, due to its composition rich in lipids, vitamins and other bioactive components.

#### Introduction

The present study presents the efficacy of sea buckthorn oil in thermal burns according to a histological score proposed by a group of researchers from China and Malaysia. The idea launched by the aforementioned researchers is to establish a histological score, as a way of quantitatively evaluating burns, respectively their healing process. It is unanimously accepted among histologists, who know the disadvantages of a qualitative assessment, represented by images, that the greatest impediment is that of morphophysiological and behavioral differences between individuals. Sea buckthorn (*Hippophae rhamnoides*) contains a variety of bioactive components, represented by vitamins, especially vitamin C, carotenoids, polyphenols, fatty acids and phytosterols, which can provide the body with numerous benefits, through antioxidant, anticancer, anti-inflammatory, antimicrobial, antifungal and antiviral effects.

#### Material and method

In the 14 days experiment, balb/c mice were used, which were induced with cutaneous thermal burns and treated with sea buckthorn oil. For the histological examination, skin samples were collected on the 3rd, 7th and 14th day, which were processed by the hematoxylin-eosin method.

### •Results and discussions

*The histological score for the epidermis*, with a range from 0 to 7, proposed by the group of researchers from China and Malaysia, which also includes its healing stages, is based on the presence and type of crust on the wound surface, the degree of re-epithelialization and the formation of dermal papillae. *The histological score for the dermis*, with the same range, from 0 to 7, proposed, which also includes its healing stages, is based on the proportion of adipocytes, the proportion of inflammatory cells, the proportion of fibroblasts, the status of collagen synthesis and the formation of hair follicles.

Without applying any treatment, taking into account that the *third day post-burn* is considered the time 0 of the beginning of the healing process, and following the established scoring criteria, the histological examination revealed the presence of a crust, attached from place to place, to the basement membrane or its absence in other areas, and the absence of the *epidermis - histological score 0*. At the dermis level, collagen fibers are denatured as a result of the action of heat and necrosis of glandular and corneous productions. The adipocyte/inflammatory cell ratio is in favor of adipocytes. Vascular congestion was also noted, and edema of striated myocytes was present - indicating a *histological score 0*.

Seven days after the burn, in the contact area, the score regarding the degree of healing of the epidermis remained 0, the progress of this process being evident at the level of the dermis. Thus, the change in the ratio between the population of adipocytes and inflammatory cells is evident, in favor of the latter, with the presence of fibroblasts, which have begun to synthesize collagen. The buds of the corneus and glandular epithelial structures are located in the dermis, after the withdrawal of the adipocytes. In the peripheral area, for both the epidermis and the dermis, the healing score was 7. In the case of the use of sea buckthorn oil, for seven days, the contact area was greatly reduced, wound healing in rodents, relying primarily on contraction, due to the striated muscle layer, followed later by epithelialization. On histological examination, the two areas, contact and peripheral, were much reduced, completely structurally remodeled, and strongly demarcated. The contact area is loaded with inflammatory cells, where a migration of epithelial cells under the crust was also observed. In the peripheral area, dermal papillae are well represented, penetrating deep into the dermis. The hair follicles are well structured.



SCOR	CRUST	REEPITHELIZATIO	DERMAL PAPILLE	Sco	Adipocyte	Inflammato	Fibroblasts	Collagen	Hair follicles
E		Ν		r	S	ry cells		synthesis	
0	Loosely attached	absent	absent	0	+++	+	-	-	-
1	Tightly attached	minimal	absent	1	++	++	+	-	-
2	Tightly attached	mild	absent	2	+	++	+	-	-
2	Tightly attached	modorato	absent	3	+	+++	+	-	-
	Na sast stached	moderate	absent	4	+	+++	++	+	-
4	No crust attached	moderate	absont	5	-	++	+++	++	-
5	No crust attached	significant	absent	6	_	+	+++	++	_
6	No crust attached	complete	adsent	7					
7	No crust attached	complete	present	/	T	T	TT	TTT	



3 days post burn: without treatment

with treatment

#### 7 days post burn: without treatment

#### with treatment

At 14 days post-burn, without any treatment, the histological examination of the skin revealed a similar appearance to that of the group treated with sea buckthorn oil, from the seventh day. After 14 days of application of sea buckthorn oil, the microscopic examination revealed the disappearance of the contact area, respectively the disappearance of the tissue changes produced by a thermal agent, in its place being found the components of the skin in the last phases of remodeling.





14 days post burn: without treatment

with treatment

### • Conclusions

The use of sea buckthorn oil in burns accelerates the healing process compared to the group that did not receive any treatment, due to its composition rich in lipids, vitamins and other bioactive components. In both cases, the healing phases proceeded normally, without being interrupted or hindered by the installation of a secondary microbial infection. The proposed histological score was extremely useful in the comparative establishment of the degree of healing of the epidermis and dermis, thus assessing, also quantitatively, the effectiveness of sea buckthorn oil.